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MODERN MECHANICS AND INVENTIONS

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Edited by Experts

Listed here are the members of the Modern Mechanics Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers concerning their departments. Address them in care of this magazine, 529 S. 7th St., Minneapolis, Minn.

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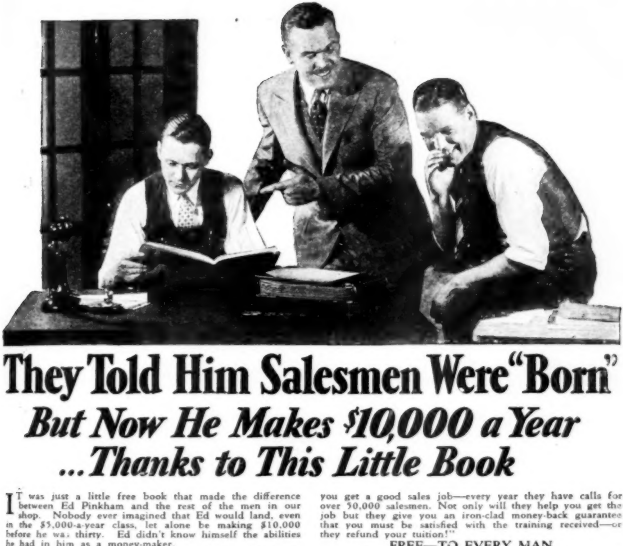

They Told Him Salesmen Were "Born"

But Now He Makes $10,000 a Year ...Thanks to This Little Book

IT was just a little free book that made the difference between Ed Pinkham and the rest of the men in our shop. Nobody ever imagined that Ed would land, even in the $5,000-a-year class, let alone be making $10,000 before he was thirty. Ed didn't know himself the abilities he had in him as a money-maker.

But one day, a strange occurrence changed his whole life. During his lunch hour Ed started to read a little book he had brought to work with him.

"It's a book called 'The Key To Master Salesmanship,' Bill," he told me. "It's the most amazing thing I ever read. I never dreamed there was so much in salesmanship. You ought to send for a copy yourself. It's free."

"Huh!" said Luke Jones. "Does that book tell you how to become a salesman?"

"It sure does," replied Ed, enthusiastically.

"Don't waste your time," advised Luke. "You can't learn how to be a salesman. A fellow has to be 'born' that way to be a good salesman."

Ed just smiled at that, but he said nothing. Soon afterward he quit the shop, and we forgot about him. And then last night, I met Ed again—driving a snappy new sedan and dressed like a million dollars.

"For Pete's sake," I said. "What are you doing nowadays, Ed?" He smiled. "City salesmanager for the Steel Castings Company," he told me. "What are you doing?"

"Still at the shop," I replied. "But what I want to know is, how do you come to be salesmanager for Steel Castings? They're one of the biggest firms in the business."

Ed smiled again. "Remember that book on Salesmanship that Luke Jones was kidding me about one day? Well when I finished my Salesmanship training the Association I took it from gave me a choice of twenty-one jobs through their Free Employment Department. I got a wonderful job, and I had a wonderful training so I've had a pretty successful time of it. They made me City Sales Manager three months ago at ten thousand dollars a year."

"Good night!" I said. "And Luke and I are still punching the old time clock!"

Ed looked at me seriously. "See here, Bill," he said. "Are you sport enough to risk two cents that you can do as well as I did? Then spend the two cents to write to the National Salesmen's Training Association tonight and get their free book. Then take their course. When you have your diploma, their Free Employment Department will help you get a good sales job—every year they have calls for over 50,000 salesmen. Not only will they help you get the job but they give you an iron-clad money-back guarantee that you must be satisfied with the training received—or they refund your tuition!"

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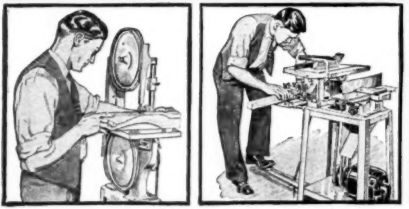

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Please send me your free book, "How To Read Blue Prints," and complete out of real Blue Prints. I understand these are mine to keep without obligation. It is also understood that no salesman will call on me.

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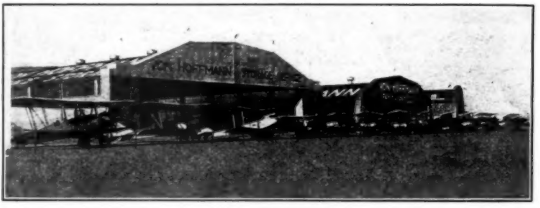

What Aviation Offers You

TO the alert, ambitious young man Aviation offers the greatest opportunity today—the chance to learn and become a part of this interesting well-paying profession. For those who prepare themselves now — who will qualify for responsible positions in this coming business — Aviation rewards with high salaries and rapid advancement in a fascinating work.

The Von Hoffmann School teaches every phase of Aviation. It is one of the pioneers of the industry and one of today's leaders. It has trained many successful mechanics and famous pilots. Red Jackson, World's Endurance Record Holder, is a Von Hoffmann graduate.

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If you are interested in making Aviation your life work send for "What Aviation Offers You." There is no obligation involved. Use the coupon below for convenience.

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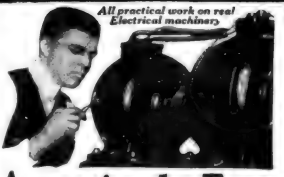
( ) MECHANICS COURSE
( ) HOME STUDY

Get Into One Of These BIG PAY FIELDS



All practical work on real Electrical machinery

Amazingly Easy Way to Get Into ELECTRICITY

Don't spend your life waiting for $5 raises in a dull, hopeless job! Let me show you how to make up to $60, $70 and even $200 a week, in Electricity — NOT BY CORRESPONDENCE, but by an amazing way to teach that makes you a practical Expert in 90 days!

LEARN WITHOUT BOOKS IN 90 DAYS

No Books! No Lessons! You learn by doing actual electrical work right here in the Coyne Shops. You are trained on huge motors, generators, switchboards, transmitting stations, power plants, auto and airplane engines, etc. You don't need advanced education or previous experience. You qualify for real electrical work in 90 days!

Earn While You Learn

Don't worry about a job! You get FREE life-time Employment Service. And don't let lack of money stop you. If you need part-time work to help pay living expenses, I'll help you get it. Coyne is 31 years old. Coyne Training is tested. You can find out everything FREE. Just mail coupon below and I'll send you my BIG FREE ELECTRICAL BOOK, telling all about jobs—salaries, etc. This does not obligate you. Just send the coupon below!

MAIL THIS COUPON FOR BIG FREE ELECTRICAL BOOK

H. C. LEWIS, PRESIDENT
COYNE ELECTRICAL SCHOOL, Dept. 90-53
500 S. Paulina Street, Chicago, Illinois

Gentlemen: Please send me your big Free Electrical Book, with 151 illustrations. This does not obligate me.

Name.....

Address.....

City.....State.....

Student working on Television transmitter in Coyne Radio Shops

Learn RADIO TELEVISION TALKING PICTURES

Every branch of Radio is calling for trained men! 5,000 Service Men needed at once. Big call for Wireless Operators, both at Sea and in the Air. Many jobs open in Broadcasting Stations, Talking Picture and Sound Experts in great demand. And now Television is on the way! Soon there'll be a demand for thousands of Trained Men in this one branch alone. Say "good-bye" to $25 and $35 a week—get into Radio, where thousands of jobs are open, paying $60 a week and up.

Not By Correspondence
By Actual Work—in 8 Weeks

Come to Coyne and learn Radio in 8 weeks! NOT BY BOOKS OR CORRESPONDENCE, but by actual Radio work on actual Radio equipment — on scores of Radio receivers, huge Broadcasting equipment, the very latest Television transmitters, Code Practice apparatus, Talking Picture and Sound equipment, etc. No experience needed. You learn all branches of Radio in 8 weeks.

FREE EMPLOYMENT SERVICE

After you graduate, I'll help you get the Radio Job you want—and if you need part-time work while at school, I'll help you get that, too. Coyne has been training men since 1899. Let Coyne train you for a Big Pay Radio job! Mail coupon below for a copy of my BIG FREE RADIO BOOK, telling all about Radio, Television, Talking Pictures, Wireless, etc. This costs you nothing. Just mail coupon below.

MAIL THIS COUPON FOR BIG FREE RADIO AND TELEVISION BOOK

H. C. LEWIS, PRESIDENT
RADIO DIVISION, COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 90-9A, Chicago, Ill.

Gentlemen: Send me your Big Free Radio Book and all details of your Special Introductory Offer. This does not obligate me in any way.

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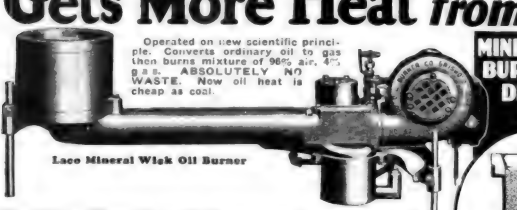
Address.....

City.....State.....

Heating Engineers Agree That This Amazing Burner

Gets More Heat *from* Oil



Sells Fastest Because it Makes Oil Heat as Cheap as Coal!

Heating engineers agree that the Laco Mineral Wick Oil Burner eliminates all waste from oil burning and makes oil heat CHEAP AS COAL. Thousands of satisfied users back up this statement and furnish CERTIFIED FACTS to prove that, in many cases, oil heat with a Laco is ACTUALLY CHEAPER THAN COAL.

The INDESTRUCTIBLE Mineral Wick—an exclusive feature of the Laco, only mineral wick burner on the market, does it! Cheap oil, passing through the red-hot fire clay crystals is changed to gas. The gas is mixed with a (96% air, 4% gas), and burned in suspension! Clean, intense flame. N smoke, no soot, no grease, NO WASTE. Gets EVERY UNIT OF HEAT FROM EVERY DROP OF OIL. That's why the world's lowest priced automatic mineral burner can also be cheapest to operate. Now oil heat is within the reach of all. Every home may be free from dirt, the drudgery, the inconvenience, of coal heat. No wonder sales last year were in the MILLIONS.

Safe, Dependable, Quiet

The Laco was PERFECTED by a foremost heating engineer before it was offered for sale. Each burner is inspected and double tested before it is shipped. Automatic safety devices. Thermostat controls temperature of room. Lasts a lifetime. The 3 interrelated features—Complete with all heat conveniences 2,000 times as many gas or coal stoves. Simple, sturdy construction, only one moving part. Unbelievably quiet. Trouble-free. GUARANTEED.

Its Own Pilot Light

Laco generates gas for the LOW FLAME that operates as a pilot light when the thermostat turns the flame down. Burns MONDAY AM. seconds for no-bothers by an hour. Comes out of it absolutely fails, the Laco Mineral Wick Oil Burner will operate perfectly unattended for 24 hours. No other burner does this!

Special Low Prices

Easy payments. Make your own terms. Pay out of savings. Laco pays for itself. A MODERN OIL HEATING PLANT in a few minutes. Install Laco yourself. Laco shows you how. Complete equipment, internal terms. Drill rigs or heating. Proof you may have one day's trial and to be satisfied. Send for low-price proposition. If not order NOW.

LACO JUNIOR

Heats 2-3 Rooms—Only $70

Costs less, and uses less fuel, than any other burner on the market. For small furnaces, parlor stoves, Heatrolas, hot-water heaters, etc. Heats 2-3 rooms. Absolutely safe. Will give years of trouble-free service. Here is a POWER OIL BURNER anybody can afford to buy. Costs only $70, uses as little as ½ pint of oil per hour. Get FULL DETAILS; write today.

Mass Production Methods Make the LACO MODEL F WORLD'S LOWEST PRICED HEAVY OIL BURNER

Tremendous demand for Laco Oil Burners has made Laco the Ford of the oil burner industry. Not three 20 sizes and styles of boilers, come in many heating units. The Model F Automatic Steam Burner completes the line. Two are alike.

of others in design. Exclusive low-pressure LAZY FLAME method of combustion makes it nearly noiseless. Doesn't blow soot, smoke out of the chimney. ELIMINATES WASTE. Reduces stack temperature 50°. Get ALL the heat from cheap heavy oil. Automatic. Write Dual Diesel Pilot Light assures trouble-free control. Trouble-free ignition. Simple, only one moving part. Modern methods make this THE LOWEST PRICED HEAVY OIL BURNER ON THE MARKET.

WRITE TODAY

LACO OIL BURNER COMPANY
2016 Union Street GRISWOLD, IOWA

DEALERS WANTED!

Get our dealer proposition. Many desirable territories still open. Learn about the SENSATIONAL PROFIT OPPORTUNITY we offer the retail dealer of the man who wants to get into business for himself on small capital. Complete line makes EVERYBODY a prospect. 20 sizes and styles. Sell to homes, stores, churches, schools, industrial plants. Competitors can't meet our PRICE, QUALITY or ECONOMY OF OPERATION.

Write (on your letterhead) today. Get busy installing burners and pocketing profits. Don't delay. Territory you want may be gone TOMORROW.

WRITE FOR SENSATIONAL LOW PRICE OFFER!

Thank You for Mentioning Modern Mechanics and Inventions for December When Writing to Advertisers

ANOTHER PARKS TRAINED STUDENT MAKES GOOD

The Story of George J. Gruen

We don't say that every Parks graduate gets a check like this monthly. We do say that the chances are better than in many professions and trades.

Parks training increases his pay from $240 to $827

George Gruen was not an "exceptional" student, in fact it was perseverance rather than the "spark" that put him over. He is a splendid example of the kind of training a man gets at Parks. And he is, also, a splendid example of the kind of a job a Parks-trained man is fitted to fill.

Bring the right kind of ambition with you to Parks—make up your mind to work hard—spend every minute of the day on the job—and you'll leave this institution better equipped to make good money than the same amount of time spent elsewhere can possibly offer you.

Three years ago George Gruen was a musician earning approximately $60 per week. Today, he owns a fine home in a St. Louis suburb.

PARKS AIR COLLEGE

World's Finest Flying School

DIVISION OF DETROIT AIRCRAFT CORPORATION

1280 Parks Airport

EAST ST. LOUIS ILLINOIS

MAIL THE COUPON TODAY!

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PARKS AIR COLLEGE, 6
1280 Parks Airport, East St. Louis, Ill.

Without cost or obligation to me, please mail your illustrated catalog.

I am interested in Pilot's Course ☐ Mechanic's Course ☐

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Street address .....
City ..... State .....
Occupation ..... Age .....

Genuine Refinished Guaranteed UNDERWOOD

Late Model No. 5

Yours for full 10 Days Trial

Yes—this world-famous Underwood No. 5 is yours for full 10 days' trial. (Positively the lowest price and easiest terms ever offered.) See how beautiful and new it looks—compare its neat, perfect work with any typewriter costing twice as much.

While They Last! Prices Smashed to Rock Bottom

Now Only $ DOWN

Save over ½ Mfgs. Original Price

Only by an exceedingly fortunate purchase direct from the manufacturers am I able to offer this amazing low price. While they last—less than half (½) the manufacturer's original price—and easy terms besides. (Do not confuse this genuine late model Underwood with inferior or frail machines worth only one-half as much.) This is the full-sized late model Underwood with standard universal 4-row keyboard of 84 characters and has all late improvements. Manufactured to sell originally for $102.50. Fully Guaranteed in writing

Late Model No. 5 Underwood

With Modern Improvements

1. Genuine Underwood No. 5
2. Standard 4-row Keyboard (84 characters)
3. 2-color Ribbon—Reversible Style
4. Back Spacer
5. Ribbon Reverse
6. Tabulator
7. Automatic Release
8. Shift Lock Key
9. Lowest Price
10. Easiest Terms
11. 10-Day Trial
12. Fully Guaranteed

Easy Terms

Only $1 a Day

Think of it—a genuine late model Underwood No. 5 reduced to $44.90 (Cash).

Send only $1 deposit for a 10-day Trial. Then only 12c a day on my easy year-to-pay plan. Use and enjoy your typewriter all the time. Remember this famous No. 5 Underwood all renewed and refinished is without question one of the greatest values ever offered at this rock-bottom price. (See column to left for its many outstanding features and improvements.)

Money Back Guarantee!

Accept my liberal 10-day trial offer. See for yourself the wonderful bargain this famous Underwood really is. Your deposit returned at once if you are not perfectly satisfied. Send now.

International Typewriter Exchange
231 W. Monroe St. Chicago

Complete Course in Speed Touch Typewriting Given During This Offer

Also Office Supply Set

Learn Speed Touch typewriting. Complete Home Study Course of the Famous Van Sant Speed Typewriting System, fully illustrated, given during this offer. Easy learned. Used in schools, business offices everywhere. We also give complete office supply set during this sensational sale.

International Typewriter Exchange,
231 West Monroe St., Chicago, Ill., Dept. 1205

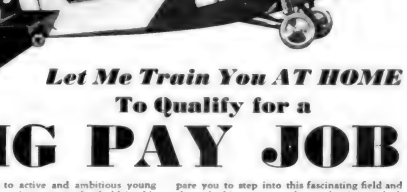
Please send the Underwood No. 5, F. O. B. Chicago, at the special reduced price for 10-day Trial. I am enclosing $1.00 deposit with the understanding that if I am not perfectly satisfied I can return it to you or collect and get my deposit back. If I keep it I will pay $4.90 a month until I have paid $49.90 (term price) in full.

Name ..... Age .....

Address .....

Town ..... State .....

Aviation Calls You!



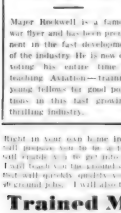
This growing industry Needs trained men

Learn to Earn $300 to $400 a month

Let Me Train You AT HOME

To Qualify for a

BIG PAY JOB



MAJOR ROCKWELL

Major Rockwell is a famous war flier and has been prominent in the fast development of the industry. He is now devoting his entire time to teaching Aviation—training young fellows to fill good positions in this fast growing, thrilling industry.

I am offering to active and ambitious young men the opportunity to get a foothold in this amazing, fast growing industry. Through my personally prepared home study course, based on my 13 years' experience in Aviation, I prepare you to step into this fascinating field and through this easy to understand training which I give you at home, you are enabled to save years of apprenticeship, reach the top fast, and soon earn up to $400 a month and more.

The Fastest Growing Industry

Aviation is destined to be one of our leading industries. New passenger airways are being opened up as fast as facilities can be provided for them. Airports are springing up all over the United States. Probably one in your town now or soon will be. The air mail increases every day, requiring more men and more planes. New construction is going ahead trying to keep pace with the fast growing demand for more airplanes. The Aviation industry is today in the same position that the automobile industry was 20 years ago. And 20 years hence it is predicted that the airplane will equal, or surpass the automobile success.

I Will Train You in a Few Months

Right in your own home in just a few short months I will prepare you to be a trained aviation man and will guide you to getting thrilling work right from the ground work up. Then, if you want to go into the flying end after you have taken my home study course, I will arrange for you to take flying instruction at some licensed airport near the place you live. But, at special reduced rate. I will help you to ability to a pilot's license by spare time study.

Trained Men Qualify Quickly

In aviation only trained men can progress fast and receive big pay. Employers in the industry demand men who know Aviation. No matter what branch of Aviation you enter, you need the ground work that I give you in my home study course to help you progress and land the big pay jobs. You don't have to have any special education or knowledge about mechanics. Everything is clearly explained with simple text and pictures. In a few short months you will have the necessary training that will start you on the road to an important Aviation job.

All Explained in this Book Sent FREE

Mail the coupon to me at once. There is a place for you in this fascinating, fast growing industry and my book tells you how to get into it in the right way. It tells you how to reach the top quickly at big pay. Mail the coupon to me and I will give you all the facts and details without obligation.

MAJOR ROBERT L. ROCKWELL
DAYTON SCHOOL OF AVIATION
Desk Z-2, Dayton, Ohio

Major Robt. L. Rockwell,
Dayton School of Aviation,
Desk Z-2,
Dayton, Ohio.

Dear Major: I would like to enter Aviation and I am interested in learning just how you can prepare me to get a foothold in this industry. Please send me your free book without obligation.

Name .....

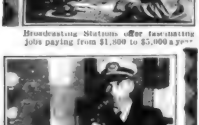
Address .....

Town ..... State..... Age.....

Broadcasting Stations offer fascinating jobs paying from $1,800 to $5,000 a year

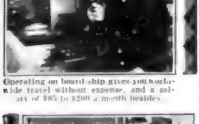
You're Wanted

Take your pick of these fine Big Pay Radio Jobs



Operating on board ship gives you world-wide travel without expense, and a salary of $85 to $200 a month besides

YOU have seen how the men and young men who got into the automobile, motion picture and other industries when they were started had the first chance at the key jobs—are now the $5,000, $10,000 and $15,000 a year men. Radio offers you the same chance that made men rich in those businesses. Its growth has already made men independent and will make many more wealthy in the future. Its amazing growth can put you ahead too. Don't pass up this opportunity for a good job and future financial independence.



Spare time set servicing is paying N. R. E. men $200 to $1,000 a year for their spare time. Earnings begin almost at once after enrolling.

Hundreds of $50 to $100 a Week Jobs Opening Every Year

Radio needs more trained men badly. Why slave your life away for $25 to $40 a week in a no-future job when you can get ready in a short time for Radio where the good jobs pay $50, $60, $75 and $100 a week? And many of these jobs can quickly lead to $150 to $200 a week. Hundreds of fine jobs are opening every year for men with the right training—the kind of training I'll give you.

I Am Doubling and Tripling Salaries

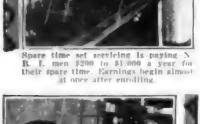
Where you find big growth you always find many big opportunities. I am doubling and tripling the salaries of many men every year. After training with me only a short time they are able to make $1,000 to $3,000 a year more than they were getting before. Figure out for yourself what an increase like this would mean to you—the many things that mean so much in happiness and comfort that you could buy with an additional $1,000 to $3,000 a year.

Many Make $10 to $15 a Week Extra Almost at Once

The day you start I'll show you how to do ten jobs common in most every neighborhood that you can do in your spare time. I'll show you how to repair and service all makes of sets and do many other jobs all through my course. I'll give you the plans and ideas that are making $200 to $1,000 for my students while they are taking my course. G. W. Page, 107 Raleigh Apts., Nashville, Tenn., writes: "I made $935 in my spare time while taking your course."

You Have Many Jobs to Choose From

Broadcasting stations use engineers, operators, station managers. Radio manufacturers continually need testers, inspectors, foremen, engineers, service men, buyers and managers. Shipping companies use hundreds of operators and give them world-wide travel with practically no expense and a good salary besides. There are hundreds of opportunities for you to have a spare time or full time Radio business of your own. I'll show you how to start one with practically no capital. My book tells you of other opportunities. Be sure to get it at once.



Commercial Land Stations are constantly needing trained men. Operators in our leading cities (Trans-Oceanic telephony offers many at $1,750 to $3,000 a year.

Radio factories employ thousands. Salaries for well trained men range from $1,800 to $5,000 a year.

$400 a Month

"I spent fifteen years as traveling salesman and was making good money but could see the opportunities in Radio. Believe me I am not sorry, for I have made more money than ever before. I have made more than $400 each month and it really was your course that brought me to this. I can't say too much for your school."—**E. Dahlstead, 1484 South 13th St., Salt Lake City, Utah.**

$800 in Spare Time

"Money could not pay for what I got out of your course. I did not know a single thing about Radio before I enrolled but I have made $800 in my spare time although my work keeps me away from home from 6:00 A. M. to 7:00 P. M. Every word I ever read about your course I have found true."—**Milton I. Leiby, Jr., Topton, Pennsylvania.**

Seldom Under $100 a Week

"My earnings in Radio are many times greater than I ever expected them to be. In November I made $577. December $645. January $481. My earnings seldom fall under $100 a week. I'll say the N. R. I. course is thorough and complete. You give a man more for his money than anyone else."—**E. E. Winborne, 1414 W. 42th St., Norfolk, Va.**

Thank You for Mentioning Modern Mechanics and Inventions for December When Writing to Advertisers

for a Big Pay Radio Job

I will train you AT HOME free book gives facts and proof

I Will Train You at Home In Your Spare Time

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively during your spare time. You don't have to be a high school graduate. My course is written in a clear, interesting style that most anyone can grasp. I'll give you practical experience under my 50-50 method of training — one-half from lesson books and one-half from practical experiments. When you graduate you won't have to take any kind of a job to get experience—you will be trained and experienced ready to take place beside men who have been in the field for years.

Television and Talking Pictures Included

My course not only gives you a thorough training in Radio — all you need to know to get and hold a good job—but also your choice, without extra charge, of any one of three special courses: Television, Aircraft Radio, Broadcasting, Commercial and Ship Radio Stations, Sound Pictures and Public Address Systems, and Advanced Radio Servicing and Merchandising. You won't be a "one job" man when you finish my course. You'll know how to handle a job in any one of Radio's 20 different branches of opportunity.

Lifetime Employment Service to all Graduates

When you finish my course you won't be turned loose to shift for yourself. Then is when I will step in and help you find a job through my Employment Department. This Employment Service is free of extra charge both to you and the employer. My Employment Department is getting three times as many calls for graduates this year as last year.

Your Money Back If Not Satisfied

You do not risk a penny when you enroll with me. I will give you an agreement in writing, legal and binding upon the institute, to refund every penny of your money upon completing my course if you are not satisfied with my Lessons and Instruction Service. The resources of the N. R. I., Pioneer and World Famous Largest Home Study Radio training organization, stands back of this agreement.

Find Out What Radio Offers You—Get My Book at Once

One copy of my valuable book, "Rich Rewards in Radio" is free to anyone interested in making more money. It tells you where the good jobs are, what they pay, how you can quickly and easily fit yourself to get one. The coupon below will bring you a copy. Send it at once. Your request does not obligate you in any way. Act NOW.

I give You $8 Big Outfits of Radio parts for a home Experimental Laboratory

You can build over 100 circuits with the outfits I give you. You learn from actual experience about A.C., Screen Grid circuits, push-pull amplification and the other features in modern sets. You work out with your hands the principles, diagrams and circuits you learn from my lesson books. You get as much practical experience under this unequaled method of home training, in a few months, as the average fellow gets in two to four years in the field.

J. E. SMITH, President

NATIONAL RADIO INSTITUTE

Dept. ONH WASHINGTON, D. C.

Salary Three Times Larger

"Before I completed your course I went to work for a Radio dealer. Now I am Assistant Service Manager of the Sparks-Withington Company. My salary is three times what it was before taking your course. I could not have obtained this position without it. I owe my success to N. R. I. training." H. A. Wilmath, Sparks - Withington Co., Jackson, Mich.

Clip and mail NOW for FREE INFORMATION

J. E. Smith, President,
National Radio Institute, Dept. ONH,
16th and U Sts., N. W., Washington, D. C.

Dear Mr. Smith:—Send me "Rich Rewards in Radio." Tell me more about Radio's opportunities for good jobs and quick promotion; also about your practical method of Home training. I understand this request does not obligate me and that no agent will call on me.

Name .....

Address .....

City ..... State

PATE

Protect Your Ideas

Take the First Step Today

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon on the opposite page.

Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trade mark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

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On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will also send you my "Record of Invention" form on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

My Offices Just Across Street From U. S. Pat. Office

Above is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ. All drawings and specifications are prepared in my offices.

NTS

Inventors Write for these Free Books

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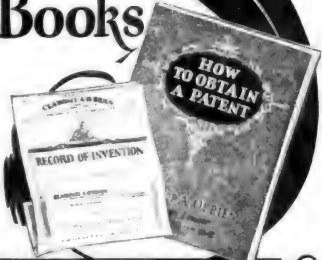

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DO I MAKE GOOD? READ THESE!

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Says Rev. C. V. McMurphy of Alabama, McMurphy got "Van's" offer. The first afternoon he made $30. He writes, "The notes on two house have been burned—we have a new car—I no longer fear financial problems." He has made at high as $300 in a week.

Mother Makes $2,000 Spare Time

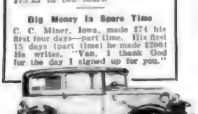
Mrs. S. M. Jones of Georgia, mother of four, says "First hour and half made $36.47." She could only work on Mondays and Saturday afternoon. But with this easy work she has made over $2,000 in a few short months.

$1,457 in Prizes

Besides big earnings every day, says Wilbur Shiler, Pennsylvania. He says, "It is easy to make $15 a day—I have made as much as $15.82 in two hours."

Big Money in Spare Time

C. C. Miner, Iowa, made $74 his first four days—part time. His first 15 days (part time) he made $200. He writes, "Van, I thank God for the day I signed up for you."



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AND I go one step further—for I let you give credit to your customers and give you a part of every dollar we take in.

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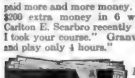
America's Most Popular Music

The haunting, soft, melodious strumming of the Hawaiian Guitar is America's most popular music. Everywhere orchestras are looking for men and women who can play the Hawaiian Guitar. Everywhere those who have mastered the Hawaiian Guitar are getting paid more and more money. Roy Reikane writes in, "I have made $200 extra money in 6 weeks playing my Hawaiian Guitar." Carlton E. Scarbro recently wrote me, "I have made $1,000 since I took your course." Granville Smith writes, "I made $8 a night and play only 4 hours."



One of the Dozens of Photos help sent with each Course

Hundreds of such letters have come in. But let me tell you about my short-cut to good times and big pay—my simplified method of learning to play the Hawaiian Guitar at home in a few weeks. A new method—so easy to understand—so much fun to learn—that even a child can pick it up. (We have successfully taught children only 8 years of age.)

Pictures Instead of Words, Teach You

I don't care if you have never read a note in your life, or don't know what a Hawaiian Guitar looks like. All I ask is that you **like** music. My methods are so clear and easy to understand that you will actually play a real melody after the very first lesson. Sounds uncanny, doesn't it? Here's how I do it.

With your lessons I send dozens of photographs showing just how to place your fingers, how to strum the strings. My Kno-All and Master charts teach you to read notes almost automatically. It's as simple as learning your A B C's over again. Some of our students become finished musicians the first month, others take a little longer, but they all learn with surprising speed.

Lonesome? It's a Sure Cure!

Once you have mastered the Hawaiian Guitar, the world lies waiting at your feet. You can travel anywhere, meet the best people, live in real style and comfort, and gain a host of friends. All this is yours, waiting for you, if you are willing to spend a few minutes a day with me for a few short weeks.

We Send You Regular Phonograph Records of Every Piece in the Course

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This is what Prutzman Did

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5,000 Radio Service Men Needed Now!

The replacing of the old battery operated receivers with all-electric Radios has created a tremendous country-wide demand for expert Radio Service Men. Thousands of trained men are needed *quick!*

30 Days of R T A Home Training

enables you to cash in on this *latest opportunity in Radio*

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Ever on the alert for new ways of helping our members make more money out of Radio, the Radio Training Association of America now offers ambitious men an intensified training course in Radio Service Work. By taking this training you can qualify for Radio Service Work in 30 days, earn $3.00 an hour and up, spare time; prepare yourself for full-time work paying $40 to $100 a week.

More Positions Open Than There Are Trained Men to Fill Them

If you were qualified for Radio Service Work today, we could place you. We can't begin to fill the requests that pour in from great Radio organizations and dealers. Members wanting full time positions are being placed as soon as they qualify. 5,000 more men are needed *quick!* If you want to get into Radio, earn $3.00 an hour spare time or $40 to $100 a week full time, this R.T.A. training offers you the opportunity of a lifetime.

We furnish you with all the equipment you need to become a RADIO Service Man!

Radio Service Work a Quick Route to the Big-Pay Radio Positions

Radio Service Work gives you the basic experience you need to qualify for the big $8,000, $10,000 to $25,000 a year Radio positions. Once you get this experience the whole range of rich opportunities in Radio lies open before you. Training in the Association, starting as Radio Service Man, is one of the quickest, most profitable ways of qualifying for rapid advancement. ¶ If you want to get out of small-pay, monotonous work and cash in on Radio quick, investigate this R.T.A. training and the rich money-making opportunities it opens up. No special education or electrical experience necessary. The will to succeed is all you need.

Mail Coupon for *No-Cost* Training Offer

Cash in on Radio's latest opportunity! Enroll in the Association. For a limited time we will give to the ambitious man a No-Cost Membership which need not . . . should not . . . cost you a cent. But you must act quickly. Filling out coupon can enable you to cash in on Radio within 30 days, lift you out of the small-pay, no-opportunity rut, into a field where phenomenal earnings await the ambitious. You owe it to yourself to investigate. Fill out coupon NOW for details of No-Cost Membership.

The Radio Training Association of America
4513 Ravenswood Ave., Dept. MM-12 Chicago, Ill.

The Radio Training Association of America
4513 Ravenswood Ave., Dept. MM12, Chicago

Gentlemen: Please send me details of your No-Cost training offer by which I can qualify for Radio Service Work within 30 days. This does not obligate me in any way.

Name .....

Address .....

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Classified Advertisements

MONEY-MAKING OPPORTUNITIES IN TABLOID FORM

Rates for classified ads, 15 cents per word per insertion, or 12 cents per word per insertion for six insertions. Minimum 10 words. Cash should accompany order. Closing date 20th of third month preceding date of issue. Address Classified Manager, Modern Mechanics Magazine, 35 East Wacker Drive, Chicago, Ill.

AGENTS WANTED

YOU are wanted to Resilver Mirrors at home. Profitable business plating auto parts, tableware, etc. Write Sprinkle, Plater, 850, Marion, Indiana.

AGENTS—new directory lists 900 wholesale items. Pruett, Brookfield, Ill.

WE START you without a dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., 435, St. Louis, Missouri.

BIG money daily selling shirts, ties, underwear, rainsuits, lumberjacks, sweaters, leather coats, mackinaws, coveralls, pants, children's play suits. Outfit FREE. Experience unnecessary. Nimrod Co., Dept. 132, 4922-28 Lincoln Ave., Chicago.

BIG PROFIT putting our gold sign letters on store windows, without experience. Samples. Consolidated, 69 BA, West Van Buren, Chicago.

FAST selling specialties, 600% profit, write. Benedictt Mfg. Co., Dallas, Texas.

JUST OUT—latest thing. Monogrammed Door-Mats. Attractive patterns and colors with individual monogram. Women buy on sight. Most homes need two. Durable rubber. Outwears three ordinary doormats. Agents making clean-up. 47 other fast selling rubber specialties. Big catalog and money making information FREE. Kristee Mfg. Co., 1462 Bar St., Akron, Ohio.

MANUFACTURER wants distributor for new "Pocket Radio", only $3.85. "Sells itself with music". Pays 100% profit. Spencer Radio, Dept. 23, Akron, Ohio.

MAKE Your Own Products, employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book Free. National Scientific Laboratories, 1936W Broad, Richmond, Virginia.

SELL 9x11 Blue signs anywhere. $3.50 brings 100 best sellers. Handy container. Write, Kaylor's, 717 N. Fourth, St. Louis, Mo.

AGENTS-buy direct-guaranteed hosiery at Lowest Mill Prices. Men's Latest Fancy Hosiery, dozen $1.45-$1.75. Ladies' French Heel Silk Hosiery, dozen $2.50-$6.00. Catalog FREE. Superior Knitting Company, Dept. 54, New Haven, Conn.

YOU MAKE 300% profit selling Orangeade signs to stores, inns, three colors, cost 35c, sells $1.50. Robinson sold 18 signs in four hours. Particulars free. National Sign System, St. Louis, Mo.

GREAT success making your own products! Have others selling them. Start this fastest Big Money Business. My "Eye-Opening" literature tells how and lists Formulas, Processes, Trade secrets of Best-Selling Specialties all kinds—all lines. Investment small, profits immense. Start anywhere. Miller Chemist, 1706 B Miller Chemical Building, Tampa, Florida.

AGENTS WANTED

CALIFORNIA perfumed beads selling like hot cakes. Agents earning money. Big profits. Catalog Free. Mission Factory K, 2328 W. Pico, Los Angeles, Cal.

AGENTS! Gold Sign Letters for store windows. 500% profit. Free sample. Metallic Letter Co., 426 N. Clark, Chicago.

GET our Free Sample Case—Toilet Articles, Flavorings, and Specialties. Wonderfully profitable. LaDerma Co., Dept. 70, St. Louis, Mo.

MAGIC GAS equals gas 3c gallon. Harmless, guaranteed product. Used by largest bus companies. Circulars, Libels, letterheads with agent's name furnished. Particulars and proof free. P. A. Lefebvre & Co., Ltd., 20 Magic Gas Bldg., Alexandria, Ont.

66 MILES on 1 gallon. Wonderful new Moisture Gas Saver. All autos. Insert to introduce. Critchlow, 803-E3, Wheaton, Ill.

300% Profit Selling Mystery Gas Lighter. Retails 25c. Costs you $1.00 doz. $9.00 gross. Sample 5c to cover mailing cost. Square Deal Mfg. Co., Rock Island, Bradford, Pa.

STRANGE fluid charges batteries instantly. Prevents sulphation, freezing and overcharging. Doubles life and pep. Holds charge indefinitely. Discards old methods. Write for free sample offer and money making opportunity. Elliott Works, Dept. 174, Des Moines, Iowa.

SUCCEED with your own products. Make them yourself. Formulas, Processes, Tradesecrets, Expert Analytical Service. Catalog, circulars free. A Thaxly Co., Washington, D. C.

AIRPLANE BUILDERS

AIRCRAFT DRAFTSMEN are in demand. Learn at home in your spare time, from trained engineers. Complete drafting outfit furnished free. Pay as you learn. Employment service. Write Ray Reynolds, Directing Engineer, California Technical College, Dept. 12, San Diego, California, for free book "Be a Drafting Expert."

VARIOUS sizes balsa, reeds, round wood, bamboo, propeller blank. A big bundle for 30c. Four for $1.00. Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

AVIATION

DESIGNERS booklet, gives sizes in ½ of wing, fuselage, rudder, fin, stabilizer, flippers, length of fuselage, how to balance ship, relation of wing and horse power. What you must know to build a successful plane. Price 50c. Barney Snyder, Rochester, Indiana.

AVIATION Helmet, pin, both $1.00. Smoukler, Box 89, G.P.O., N. Y. C.

HENDERSON & HARLEY motor converted. All work guaranteed. Letter quote on converting your motor. Satisfaction assured. Write, Sensenich Bros., Lititz, Pa.

AVIATION

GUARANTEED, remanufactured Henderson engines, $175.00 up. New deep cases at additional cost. One new 1930 Henderson converted guaranteed, $275.00. Ten cents in stamps brings you the catalog. Sensenich Bros., Lititz, Pa.

BLUE PRINT for building speedy ice sled $2.00. Blue print for installing thrust bearing in Harley motors, $1. Sensenich Brothers, Lititz, Pa.

SOMETHING NEW? Black leather neck ties, outwears cloth several times. Always looks neat. Gift that need to be appreciated. Send $1. for one or two for $1.79 by mail postpaid. Remit by Money Order. Satisfaction guaranteed or money refunded. Tulsa Motor & Cycle Co., Dept. MM, Tulsa, Oklahoma.

HEATH PARASOL—Build America's most popular sport plane now for only $199.00. Highest quality parts sent you in 11 convenient, progressive groups. $12.00 brings first shipment. Hundreds of enthusiastic builders declare Heath plans clear and easy to follow. Send 10 cents today for large illustrated booklet. Heath Aircraft Corp., Dept. 11-MM, Chicago, Illinois.

HEATH propellers give decidedly improved performance in wind buggies, ice sleds and airplanes, because they are made by skilled engineers to fit each individual job. Yet they cost no more than ordinary stock propellers and are backed with 22 years of experience. 4 cents in stamps brings catalog. Heath Aircraft Corp. Dept. 11-MM, Chicago.

EFFICIENT propellers, 4 ft., $8.00; 4½ ft., $10.00; 5 ft., $12.00. Special Henderson propeller, $15.00. Ten cents brings you the catalog. Sensenich Bros., Lititz, Pa.

THE NEW Heath B 4 Aircraft Engine—recent winner of the world's championship at the Los Angeles Air Races, is the latest development in light plane design. Offers you more efficient and dependable performance at 50% less cost than any other motor. Purchase price, fully equipped, less propeller, only $300.00. Delivers 30 horsepower at 3,000 R.P.M. Also, Heath Henderson rebuilt motors in excellent condition, as low as $195.00. Fully guaranteed. 10 cents in stamps or coin brings large catalog.—Heath Aircraft Corp., Dept. CT-10-M.

$175 will build our beautiful, Henderson powered, high speed, steel fuselage, one place monoplane, plans $1.00. Literature 10c. Barney Snyder, Rochester, Ind.

AUTOMOBILES AND ACCESSORIES

66 MILES on 1 gallon. Wonderful new Moisture Gas Saver. All autos. Insert to introduce. Critchlow, 803-E2, Wheaton, Ill.

SAVE MONEY on Auto and Truck repairs. 50 to 75 per cent discount on used parts. Price list free. Century Parts Co., 1714 Lafayette Ave., St. Louis, Mo.

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Classified Advertisements

BUSINESS OPPORTUNITIES

MAKE MONEY collecting money. Become a collection manager or start a paying business of your own, spare or full time. Good income. Quick results. Interesting booklet sent free. National Collectors Association, 20 Connell Bldg., Newark, Ohio.

66 MILES on 1 gallon. Wonderful new Moisture Gas Saver. All autos. I sent to introduce. Critchlow, 803-E1, Wheaton, Ill.

CAST your own Lead Soldiers, Indians, Hunters, Wild and Farm Animals, 235 different moulds to select from. Send 5c in stamps for illustrated catalogue. Henry Schiercke, 1034 72nd St., Brooklyn, N. Y.

SIGNS and Showcards easily painted if you use Letter Patterns. Write for Free Sample. John Rahn, A2120 Neva Ave., Chicago.

SUCCEED with your own products. Make them yourself. Formulas, Processes, Trade-Secrets, Expert Analytical Service. Catalog, circulars free. A. Thaxly Co., Washington, D. C.

FANCY woods for making models and toys. Send one dollar for samples. Fifty cents for price list. Ross Brumbaugh, Reedsville, W. Va.

CARTOON COURSE

THE ACE of Cartoon Courses for only $2.98. Particulars Free. Carl Anderson School, Madison, Wis.

CHEMICALS

BECOME full fledged chemist—thousands of opportunities—learn at home. Home laboratory set given—apparatus and chemicals—write for free book. Chemical Institute, 19 Park Place, Dept. M-110, New York.

CANCELLED STAMPS and COINS Bought

WE PAY $1 to $10 per 1000 for used stamps. $2 to $100.00 for certain coins. Illustrated Book Prices Paid, 10c. Rebuem Co., Cohoes, N. Y.

COINS

AMERICAN Coins bought, sold. Coin value booklet 25c. Frank Saco, 735 45th Street, Brooklyn, N. Y.

DISTRICT MANAGERS

WANTED District Managers. Oldest Organization of its kind in Accident and Health Insurance. Write today for information. Dept. 21, Inter-State Business Men's Accident Ass'n, Des Moines, Iowa.

DUPLICATING MACHINES

"ENGELLOGRAPH" Portable Rotary Stencil Printing Duplicators $39.00. Equipped. Terms, description, testimonials, printed samples. Free. Pittsburgh Typewriter Supply Co., Department Pittsburgh, Pa.

DETECTIVES

DETECTIVES earn big money. Excellent opportunity. Experience unnecessary. Particulars free. Write, George Wagner, 2190-V Broadway, N. Y.

EQUIPMENT MACHINERY

BATTERY CHARGERS for Service Stations. Prices lowered. Direct from Factory. Write for bulletin 16. Adams-Barre, Columbus, Ohio.

FARM LAND

TUNG oil varnish tree groves. Suburban Orchard Growers, Biloxi, Miss.

OZARKS—20 acres, timbered, poultry, fruit, berry land. Hunting, fishing. $100.00, $5.00 monthly. Hubbard, 227 Grossman Bldg., Kansas City, Kans.

FOR SALE

WATCHMAKERS Lathe for sale at a bargain. R. Jaegermann, 5815 Easton Ave., St. Louis, Mo. Dept. 10.

FORMULAS

ANY formula $1.00; absolutely guaranteed, or money refunded. Send for free lists. Doris Chemical Laboratories, 1311B East 84, Cleveland, Ohio.

LIQUID Leather, Plastique Wood, Crepe-rubber Soles, Transferine, Auto mobile Preparations, Including Instantaneous Refinisher and Instantaneous Battery Recharger, Cosmetics — Complete Line, Cleaners—All Kinds, Candies, Foods, 50c Each. Practically any formula, 50c. Just send 50c and name it. Catalog Free. Industrial Institute, Department 301, 64 West Randolph, Chicago.

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INVENTORS: Now you can Protect, Sell, or Investigate the value of your inventions or ideas without spending a penny. Our products or services free. Save hundreds of dollars and many months delay. Inexpensive. Guaranteed. Write Inventors Protection Bureau. Dept. 22. 173 West Madison, Chicago.

GLIDERS

GLIDERS and parts made to order. Write for particulars to Ernest Schow, Preston, Idaho.

HYPNOTISM

25 LESSONS in Hypnotism. $1.00 postpaid. J. Tillberg, Proctor, Vt.

FOR INVENTORS

GET PATENTS yourself. Legal blanks, instructions, $1. Cutting Sons, Campbell, Calif.

INVENTOR'S Universal Educator; contains 900 mechanical movements; 50 Perpetual Motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price $1.00 postpaid in U.S.A. Address Dieterich Co., publishers, 602A Ouray Building, Washington, D. C.

INVENTIONS commercialized. Patented or unpatented. Write, Adam Fisher Mfg. Co., 582 Enright, St. Louis, Mo.

I SELL patents. A Service for the inventor. Established in 1900. Expert interest, respectful, take chances? Charles A. Scott, 773MM Garson Ave., Rochester, N. Y.

LUMBER

SAMPLES 35 Rare Woods $2.00: 20 Cabinet Woods $1.00. Sets labeled and postpaid. Lumber, panels, veneers, inlay woods and supplies. Send 5c illustrated catalogue. Craftsman Wood Service Co., 163 West 74th Street, Chicago.

MALE HELP WANTED

LABORERS needed, jobs guaranteed or money refunded. Send 15c postage for list 180 construction companies now hiring men. Harrington, Lyons, Wis.

MAKE big profits silvering mirrors. Easily learned patented process. Plans free. Wear Mirror Works, MM, Excelsior Springs, Mo.

POSITIONS on Ocean Liners—Experience unnecessary; good pay; list of positions free. 292-E, Mount Vernon, New York.

FIREMEN, Brakemen, Baggagemen; colored Train or Sleeping Car Porters, $150-$250 monthly. Experience not necessary. 311 Railway Instruction Bureau, East St. Louis, Ill.

DETECTIVES. Work home or travel. Experience unnecessary. Write, American Detective System, 2188 Broadway, N. Y.

MOTORCYCLES

MOTORCYCLE Bargains, lowest prices, bargain sheets for stamp, special aviators supplies, motorcycle accessories largest line in America, lowest prices. Largest motorcycle mail order house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

MOTORCYCLES, $25 to $100, easy terms. Side car, $25; engines for airplanes, motorcycles, boats and sleds, $15 to $100. Airplane wheels, $3. New Firestone tires, $5; frames, $3; forks, $3; wheels, $1; chains, $2. New 30x3½ automobile tires, $2. Belts, magnetos, generators, tanks, cylinders, pistons, handle bars, saddles, parts. New low prices. Save dollars. Rebuilt bicycles, $9.50. Send 50c for catalog. Price Cutter Deninger, Rochester, N. Y.

BARGAINS? Used and rebuilt Motorcycles $15 to $175. Some of them look like NEW. Send 10c in stamps for Bargain Bulletin and Magazine. Tulsa Motor & Cycle Co. Dept. MM, Tulsa, Oklahoma.

MAGIC

MONEY in Magic—Beautiful catalogue, 10c; stage money, 50 bills, 20c. Oaks Magical Co., Dept. 200, Oshkosh, Wis.

MOTION PICTURES

SOUVENIR strips Movietone Photophone Talkie Film; Big list film bargains and samples all for dime. Eastin Feature Films, Dept. M, Galesburg, Illinois.

MAGIC GOODS

FOUR Big Magic Catalogs and Seven Mystifying Optical Delusions postpaid 15c. Gilmagico, Morgan Park, Chicago.

MODELS

INVENTORS: Send us sketch or crude model of your idea. Crescent craftsmen will develop it into a practical working model. 30 years of successful experience and thousands of satisfied clients. Confidential service guaranteed. Bank references furnished. Free illustrated book: "Making Inventions Pay." Crescent Tool Co., Dept. T-12, Cincinnati, Ohio.

CLASSIFIED ADVERTISEMENTS—CONTINUED

WANTED: MISCELLANEOUS

MAIL us your discarded jewelry, gold, crowns and bridges, watches, diamonds, silver, platinum. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable), Dept. 21, Chicago.

MECHANICAL FERRETS

HUNTERS and trappers: See and try the "Screw-Bug," a mechanical ferret for routing rabbits, skunk and other burrowing animals. Sold direct by mail, allowing five days' trial with an absolute money back guarantee. Price $4.00 each with order, or collect plus postage. Free circulars. The Grabow Co., Dept. S, Huntington Station, L. I., New York.

PATENTS

INVENTIONS, patented or unpatented, may best be sold through organized cooperation. Booklet free. Write today. Chartered Institute of American Inventors, 1125 Barrister Building, Washington, D. C.

PATENT ATTORNEYS

PATENTS Procured; Trade Marks Registered — Preliminary advice furnished without charge. Booklet and forms for disclosing idea free. Irving L. McCathran, 703F International Building, Washington, D. C.

PERSONAL

TOBACCO, snuff habit overcome or no pay. Remedy sent on trial. Costs $2.00 if cured. Paramount Remedies, Box 71F, Oak Park Station, Flint, Michigan

RADIO

NO BATTERIES, No Tubes! New Scientific crystal radio brings endless enjoyment. Introductory price $1.00. Agents' proposition included. Music Sales Co., Dept. BA, Independence, Mo.

SONG WRITERS

SONGWRITERS! Advance royalty payments, new talking picture song requirements, etc., fully explained in our free instructive booklet. Write today. Song poems examined free. Newcomer Associates, 1674 Broadway, New York.

SONG Poem Writers—"Real" Proposition, Hibbeler, D195X, 2104 Keystone, Chicago.

STAMP COLLECTING

96-PAGE Illustrated Stamp Album and 100 different stamps—25c to approval applicants. Ohio Stamp Co., Dept. M, Box 249, Cleveland, Ohio.

300 DIFFERENT stamps 20c. Michael, 942 So. 23rd, Bellwood, Ill.

105, CHINA, Etc., 2c. Album (500 illustrations) 3c. Bullard, 446 Tremont, Boston.

ALBUM, 1,000 Hinges, 200 foreign, 25 Cuba, 25 Japan, 35c. Burtis Company, Saratoga, N. Y.

BIG FREE outfit! Approvals. Postage 4c. Angleco (M) South Berkeley, California.

FREE 200 different stamps, postage 4c. Peabody Co., 3846 N. Dupont, Minneapolis, Minn.

FOR BOYS AND GIRLS

EARN Christmas Money. Write for 50 sets Christmas Seals. Sell for 10c set. When sold return $3.00 and keep $2.00. St. Nicholas Seal Co., Dept. 135-MM, Brooklyn, N. Y.

ROOTS AND HERBS

HERB Doctor Book—10c; 250 recipes for making herb medicines. Hazzard Company, Box 41, Venderveer Park, Brooklyn, N. Y.

STAMP COLLECTING

STAMPS! 102 different 2c; Album (2800 spaces) 20c; 1000 hinges 7c; Steel Stamp Tongs 3c; Watermark Detector 2c. Tatham Stamp Co. (D9), West Springfield, Mass.

SET CATALOGUES $5.01 for 40c. Approvals. Palmer, Box 190, Jackson, Miss.

FORTY different United States stamps with price list, 12c. Seidenberg, Baroda, Mich.

100 DIFFERENT stamps Free to approval applicants. Buckingham, 1321 East 1st, Duluth, Minn.

OF INTEREST TO MEN

THE CONFIDANT—an amazing new hygienic magazine for men—prints what every intelligent man wants to know about his own body and health! Deals frankly, scientifically with every phase of Personal Hygiene, Heredity, Marriage, Social Conduct, Prevention of Disease, Family Limitation, Virile Manhood, muscle and morals. Educational, confidential, dependable! You'll like it—or your money back! Send $1.00 for 1 year, with 5 back numbers besides. Sample, 25c. The Confidant, Dept. MX, Battle Creek, Michigan.

FORMULAS FOR SALE

FREE formula catalog. Agents money makers. Western Chemical, Salem, Oregon.

WIRELESS

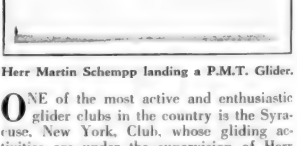
LEARN Wireless (Radio) and Morse telegraphy. School, oldest and largest; endorsed by Telegraph, Radio, Railway and Government officials. Expenses low — can earn part. Catalog free. Dodge's Institute, Clark St., Valparaiso, Ind.

MISCELLANEOUS

GILLETTE blades honed, stropped, 1c each. P. Wetterquist, Rockford, Ill.

A cabinet size photo of a famous movie star, suitable for framing, appears each month in SCREEN PLAY SECRETS. Get your copy now at the nearest newsstand—25 cents.

Syracuse Glider Club Active



Herr Martin Schempp landing a P.M.T. Glider.

ONE of the most active and enthusiastic glider clubs in the country is the Syracuse, New York, Club, whose gliding activities are under the supervision of Herr Martin Schempp, famous German glider expert. The Club has its own factory, which not only makes gliders but is available for repairing them in case of damage.

Mr. Schempp took his gliding instruction under Wolf Hirth, German glider expert.

Thank You for Mentioning Modern Mechanics and Inventions for December When Writing to Advertiser.

Only $2.00 down

BRAND NEW

CORONA GENUINE Model #3

Lowest Price—Easiest Terms

HERE'S your chance to own that *brand new* Genuine Model 3 Corona you've wanted—on the easiest terms ever offered—at LOWEST PRICE ever offered. Complete in every detail; back spacer, etc. *Manufacturer's Guarantee.* Recognized the world over as the **finest, strongest, sturdiest portable built.**

S. Joveton writes: "It truly is a wonderful machine. I am very pleased with it and find it very simple to work although it is the first typewriter I have ever used."

Don P. Fina, composer and pianist says; "Corona has helped me put my songs over and is still doing it. I find it just the thing for writing words to songs and for all correspondence to the profession."

F. J. Barsuglia, Jr., writes: "I am very well pleased with your little Corona and I must say I do not know what I would really do without it. It works like a charm and has every convenience of a larger machine."

Mrs. G. Bernstein says; "Allow me to thank you for prompt delivery of the Corona. I am delighted with it and know I shall derive great pleasure from its possession."

Yours for 10 DAYS FREE

Try this wonderful portable typewriter—the same machine that has satisfied 500,000 users. Experience the joy this personal writing portable typewriter can give you! Use it ten days free! See how easy it is to run and the splendidly typed letters it turns out. Ideal for the office desk, home, traveling. Small, compact, light, convenient. Don't send out letters, manuscripts, reports, bills in poor handwriting when you can have this Corona at such a low price on such easy terms. Remember these are *brand new* machines right out of the Corona factory.

Carrying Case Included

If You Act Now!

Leatheroid carrying case, oiler, instructions free on this offer. Send no money—just the coupon. Without delay or red tape we will send you the Corona. Try it 10 days. If you decide to keep it, send us only $2—then $3 a month until our special price of $39.90 is paid. Now is the time to buy. Mail coupon today!

Save Money—Use this Coupon

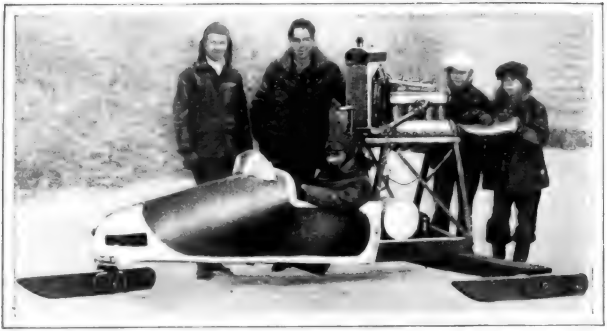
Smith Typewriter Sales Corp., (Corona Division)
469 E. Ohio St., Chicago, Ill. Dept. C-17

Ship me the Corona, F. O. B. Chicago. On arrival I'll deposit $2 with express agent. If I keep the machine, I'll send you $3 a month until the $37.90 balance of $39.90 price is paid; the title to remain with you until then. I am to have 10 days to try the typewriter. If I decide not to keep it, I will repack and return to express agent and get my money back. You are to give your standard guarantee.

Name .....

Address .....

Employed by .....



From left to right are Dick Andrus, Billy Polzin, Waldo Polzin, Bill Allen and Edison Polzin of Boulder, Colorado. The ice boat which they designed and built themselves is powered with a 1917 Ford motor driving a 3½ foot propeller. It carries only one passenger, and with this load makes 50 miles an hour. The frame-work is of wood, while the cowling is of sheet metal.

Andy's Shop Mail Box

ODD McINTYRE, Walt Winchell and Cal Coolidge may now step up and shake me by the hand, for Andy, the grease monkey, has now become a power in this column-conducting business. If you don't believe me, take a look 76 of this issue of Double-M. The guy that wrote that announcement tried to give me a razzing, but just between you and me and the hangar door, I'm the guy that put that light-plane contest over. I'm also one of the judges, so you may rest assured that justice will be committed in awarding the prize. But please, gang, don't ask me to work out your engineering problems like you have been in the past, for I couldn't do it for one and still remain impartial. After the contest is over the light-plane question-box will be opened again.

* * *

NOW that winter is here, you speed-bugs will no doubt be turning your attention from gliders and light planes to ice yachts. What do you think of that job shown on the top of the page? Billy Polzin and Dick Andrus sure turned out a neat little ship. It's all their own idea too.

Three other boys from Chicago, Harry H. Hauesman, William J. Croix, and Peter G. Tiltges, Jr., also pooled their efforts. Here's what they have to say:

Enclosed you will find pictures of the last word in home made ice boats. This is the fourth one we have built and it is a real success. It was officially tested at Wolf Lake for 70 miles per hour. The motor is a souped-up Harley Davidson two cylinder. The prop is a Heath-built racing type 3½ feet in diameter. The boat is steered by the tail the same as an airplane. We use steel tube running gear. Everything is home made but the prop, the blue prints and designs were made by Hauesman.

(Continued on page 36)

This airplane ice boat makes 70 miles an hour.

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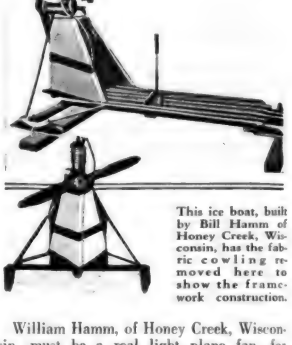
More Hangar Gang Ice Boats

(Continued from page 34)



This ice boat, built by Bill Hamm of Honey Creek, Wisconsin, has the fabric cowling removed here to show the framework construction.

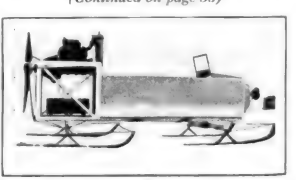
William Hamm, of Honey Creek, Wisconsin, must be a real light plane fan, for besides building him one of the Double-M ships he has installed a stick control on his ice yacht for steering purposes.

Below is a picture of a snow sled built by Sverre Running of Broderick, Saskatchewan. He says in part:

The power plant is a Model T Ford engine with the flywheel and transmission removed, and turns a 5-foot prop. I carved the prop myself but do not know if it is as efficient as it might have been. I get fairly good speed.

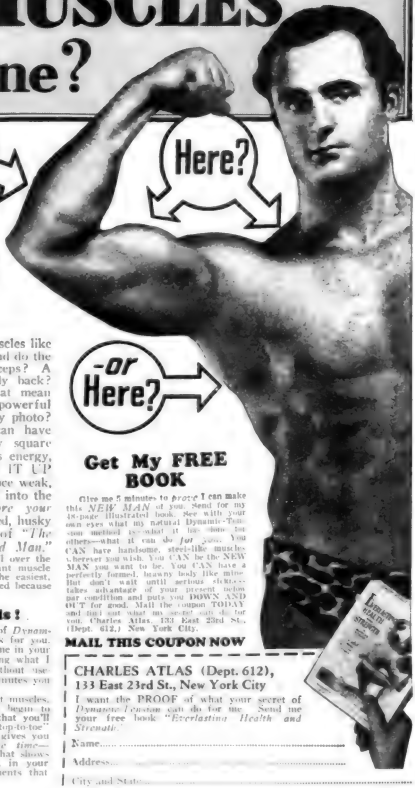
Now here's what I'd like to see in the mag. Some dope on how to design a prop

(Continued on page 38)



This Ford-powered snow sled may be seen on roads around Broderick, Sask., this winter.

Where do YOU want BIG MUSCLES like mine?



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I'LL show you how to get big muscles like mine—where they look BEST and do the MOST GOOD. Want huge biceps? A powerful chest? A strong, sturdy back? Legs with long, lithe muscles, that mean both strength and speed? The powerful abdominal muscles that show in my photo?

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On Pepping Up the Ford

(Continued from page 36)

that would be suitable for a Ford motor for sleigh use.

One good point about running a column is that so many kind souls are ready and anxious to write it for you. While I take time out to service up Orv Hickman's glider I'll let somebody else work on the column. Here's a letter from a couple of fans who want to know all about pepping up a Model T Ford. They ask many questions that have been bothering a lot of folks, so we'll run it as is:

* * *

Mr. Ray F. Kuns,
Modern Mechanics Auto Editor.
Dear Sir:

When you give us your article on small racing cars and pepping up the Ford T motor as hinted in the January issue, will you please give us some light on a few particular points?

We already have our model T Fords converted into snappy underslung racing flivvers but before we give them the gun we would like to know just how much we ought to ask of old Liz. How will the Ford motor stand up if run full open for hours at a time? Can we make a full day's trip at full speed without destroying the motor? Our cars are equipped with water pumps, (fan belt driven) 24 blade impeller fan, force feed oiling system, extra large by-pass muffler with cut-out (Taylor Loudspeaker) and 3-1 ratio gears.

What benefit, if any, will be derived from counterbalances on the crankshaft? Higher compression head? Which ignition system is the best, the regular Ford equipment of spark coils or a coil and distributor? Of what benefit are spark intensifiers and gaps? Can we install a better carburetor? If so what kind or type?

We are contemplating a trip of about 400 miles and figure to do it in about 10 to 12 hours. Will this be too much to expect from a Ford so equipped? Can you tell us how to get this kind of service from our motors? On a trip like this, what grade and type of oil would you suggest?

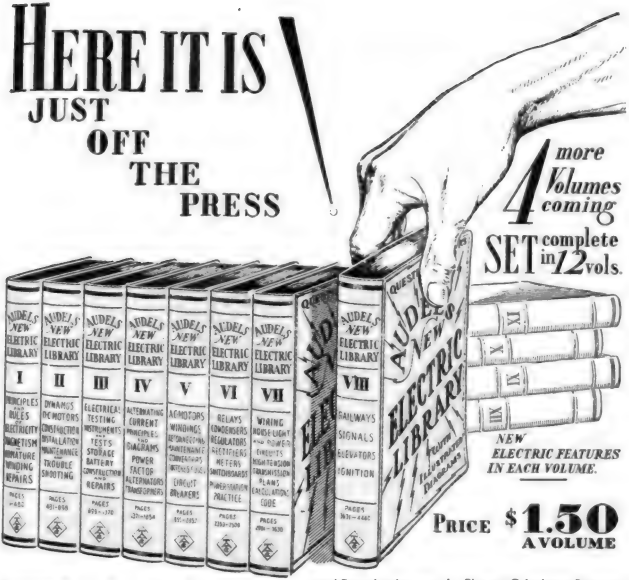
What causes the Ford generator to burn out? We have been having trouble of this sort and would like to know if it is the fast driving that causes it and if so, how to set them against it.

I hope that this deluge of questions won't cause you any disturbance, but I think that they are general questions that will interest all concerned. We all hope that your article won't be long in coming but long in content.

Respectfully yours,
OLE K. SCHMIDT
JOHN C. REED.

(Continued on page 40)

HERE IT IS JUST OFF THE PRESS



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Ray Kuns Says a Few Words

(Continued from page 38)

Well, sir, Mr. Kuns, being a thorough workman, answered the letter with a young book, and it is so interesting we can't help running it here. We think this will answer the slough of mail we get on souped up Ford cars. Heah 'tis:

Mr. Ole K. Schmidt,
Mr. John C. Reed.
Gentlemen:

No one can guarantee the performance of any mechanical device, and it would not amount to anything if an attempt was made to do so. What we can do is to explain what is reasonable to expect, and cite results already experienced. So much depends upon the quality of workmanship and materials used. Our contacts show us that in most cases success comes, with experimentation, to those who hold on and profit by mistakes. Now for more definite answers to your questions.

HOW WILL A FORD MOTOR STAND UP?

If your engines are in proper balance, the bearing metal is in good condition, crank shaft journals round, shaft in balance, bearings with proper clearance, oiling system of pressure type, cooling system of sufficient efficiency and capacity, and other mechanical items in good condition, then you should be able to drive your cars indefinitely at high speed without any serious consequences.

We personally know of a number of Ford model T cars which have been driven at 40 miles an hour, hour after hour, without any difficulty. With your special built cars we should be disappointed if you could not average a 50-mile rate over good roads. Model T Ford cars have been used on the race track for many years, and have many enviable records. I believe the best was the one made by Gaston Chevrolet with a Frontenac head at Indianapolis in 1919, in which he covered 500 miles at the rate of 79.5 miles per hour.

The model T Ford has not been in the big time races to any extent in the late events, but has been a consistent winner on dirt tracks for many years. These cars frequently average as high as 60 miles an hour for a hundred miles.

COUNTERBALANCES

If you place a counterbalance on the crankshaft, we would suggest lightening the flywheel, in order to get "snappy" pick-up. A well-balanced set of counterbalances on the crank shaft, removes vibration, and tends to smooth out the power flow. They are not necessary to high speed.

HIGH COMPRESSION HEAD

Experiments in the laboratory show that there is a definite gain in power when high compression heads are used. Naturally, the

(Continued on page 42)

While Untrained Men are looking for Jobs..

Good Jobs are looking for Trained Men

THE most important lesson a man can learn is that to succeed, he must specialize in some one field. Often this lesson is learned too late in life. Then it's tragic. You can see living examples of such tragedies around any Employment Bureau. Jacks of all trades . . . who don't know any one trade well enough to hold a real job. They're always the first to be laid-off. What is so pathetic as the middle-aged man who finds himself out of a job and then finds that no one wants him? He is the man who hasn't specialized. Nothing else can assure you of a better future, a bigger career than specializing in one field while you are young. The time to *prepare* yourself for that future is in your spare time. The more prosperous the industry you choose—the more prosperous you will be. So, when planning your career—pick one in the industry that's *growing fastest, promoting men quickest, paying men highest*. Choose *Aviation*—the most fascinating field of all time! The *one* industry where good jobs are always looking for trained men!

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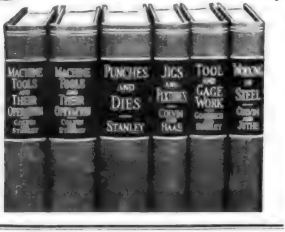

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Ray Kuns Says a Few Words

(Continued from page 40)

increase in power, places a greater strain on the engine parts. Tests on stock model T power plants, show a gain of from 3 to 4 horse power without any other changes. If you are going after extremely high speed, we would suggest that you have the compression raised, by all means. You may do this by putting on special heads, or having the regular heads planed down. Be very careful not to get in trouble with the piston striking the head, since the piston passes the cylinder barrel top.

IGNITION SYSTEM

As a rule special ignition systems are used with the model T jobs, when they are speeded up. We would suggest either the Delco battery ignition, or the Bosch high tension magneto. You will find that the motor will run smoother owing to the fact that the timing of the spark will be more accurate. We would suggest that you keep away from the spark intensifiers, although under certain conditions they may seem to give better results. If all other features are right, you will not need them.

CARBURETOR

You can increase the "snap" and power of your Ford considerably, by installing a Winfield carburetor. The Winfield is a specially designed and built carburetor, having in mind pick-up and speed. It is used on many of the racing cars. They may be secured from the R. & R. Manufacturing Company, at Anderson, Ind.

SPEED

400 miles in ten to twelve hours is not slow, neither is it so fast in these days. As mentioned above, we would be disappointed if you could not maintain a rate of speed over good roads which would average 40 miles or better per hour. You must remember, of course, that everything must be mechanically right and a great deal depends upon the skill of the driver.

As to the grade of oil, we would suggest that you use a medium grade of Pennsylvania oil. We suggest the Pennsylvania or paraffine base oil because it has a rather high flash and fire test, and will stand a great engine heat, before breaking down.

FORD GENERATOR BURNING OUT

Doubtless it is the speed at which you are turning up the Ford generator which causes it to burn out, and we know of no way to guard against this, since it seems they are prone to do it. We know of a number of Ford generators which have been installed on high speed engines which have given the same trouble. Setting the output of the generator to its lowest point by changing the adjustment of the third brush, sometimes helps. If this does not cure your trouble, we would suggest that you try to put one of the late type model A generators on, since they seem to stand considerable speed without any evidence of trouble.

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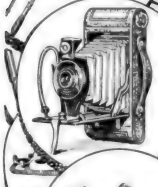

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Harnessing the Power

Lowering one of the water pipes for the Claude power project in the sea off Matanzas, Cuba.

When coal mines are exhausted, where is industry to obtain the power to keep its wheels turning? What sources of power are now lying dormant, waiting for some engineering genius to harness them? This important subject, of ever-present interest to scientist and layman, is fascinatingly discussed in this authoritative article.

DR. Georges Claude, brilliant French inventor, recently expended a million dollars and, after two unsuccessful attempts, succeeded in launching a mile long steel tube, some six feet in diameter, in the waters of the sea off Matanzas, Cuba. And most of the world is still wondering what he is trying to do.

The briefest answer is that Dr. Claude, who is best known in this country as the inventor of the neon lamp and sign, is attempting to harness the power of the sun.

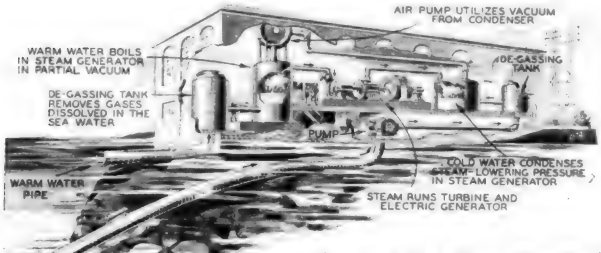
Seems strange to go down under the sea to capture the power of the sun, but if he succeeds in doing on a large scale what he has already demonstrated in a small way he may soon be generating enough power to run all Cuba, with a surplus to be exported by way of an undersea cable to Florida.

The sun heats the surface ocean water in the tropics to temperatures as high as 28 degrees, Centigrade, while 400 meters down the sea is as cold as 4 degrees, Centigrade. If the two bodies at different temperatures could be brought together water could be boiled, in a partial vacuum, producing power equivalent to a 300-foot waterfall.

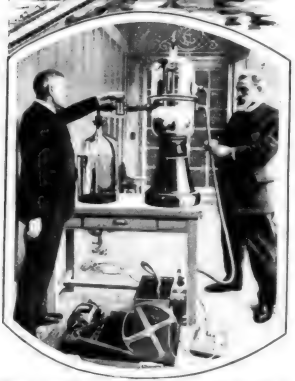
In demonstrations before the Havana Academy of Science last year Dr. Claude showed that with the difference in temperature between ice at melting point and water

of the SUN

Future Sources of Power
Described by
WILLIAM J. HARRIS



The project of Prof. Georges Claude, French scientist, to obtain power from the warm waters of tropic seas, is one of the most ambitious yet advanced, and is scientifically sound. As shown above, warm surface water, at a temperature of 80 degrees, is pumped through a de-gassing tank into a steam generator in which a vacuum exists, causing the warm water to boil. Steam thus generated runs a turbine and electric generator, and passing on is condensed by cold water pumped from the sea bottom. In condensing, a partial vacuum is created which runs an air pump which lowers the pressure inside the steam generator. The process is thus self-sustaining.



Prof. Claude, best known in America for his invention of the neon sign, is shown at left above demonstrating a model of his power apparatus.

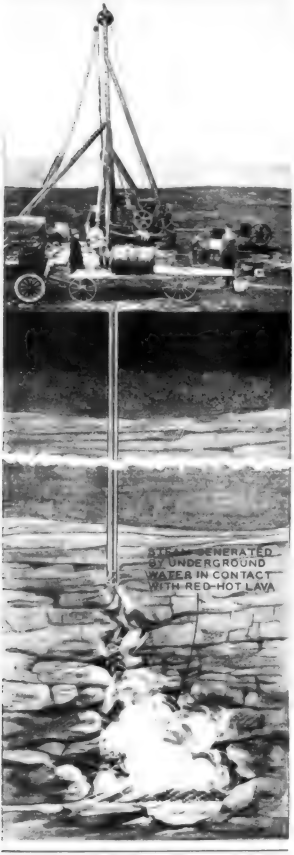
at 68 degrees Fahrenheit—a difference of 36 degrees, sufficient vapor was released to run a small turbine at 5,000 r.p.m.

Following the launching of the tube Prof. Claude announced that 4,000 cubic meters of deep sea water was being obtained each hour, at a temperature of 13 degrees Centigrade. The actual temperature at the lower end of the tube, 650 meters below the surface, was 10½ degrees, so there was a temperature rise of only one and a half degrees as the cold water was brought up through the warmer layers above.

In his power plant there is a huge tank filled with warm surface water. When the air in the tank is exhausted the water boils and provides the steam to operate the turbine driving the generator. The purpose of the cold water brought from the depths of the sea is simply to cool the exhaust steam at a rapid rate and so provide the vacuum to operate the air pump, which in turn exhausts the air from the warm water tank, and so converts the process into an endless chain.

The present plant, with a 50 kilowatt generator, is only an experimental affair, and, if successful, probably will be abandoned in favor of a much larger one located at some other spot in Cuba.

Sun motors, usually huge collections of mirrors set to capture the sun's rays over an area of many hundred square feet and focus them on a small spot, are not new. Such motors are working in California and in the



An early attempt to tap the steam pocket existing in the volcano Mauna Loa in Hawaii is depicted above. Inadequacy of drilling equipment caused the effort to be abandoned.

Sahara. But Dr. Claude's plan to trap the heat of the sun indirectly is the most ambitious sun power scheme ever conceived.

The sun motor can produce, in any of its present forms, only a fairly limited amount of power because the expanse of mirrors soon becomes too unwieldy to be moved and kept in focus, and the energy that may be trapped is limited to the amount of sun heat falling on a limited area during the hours of sunshine.

But with Dr. Claude's scheme power can be produced by night as well as by day, on cloudy days, and with no limitation on the total energy trapped. The surface water of the tropical sea does not cool enough on cloudy days or at night to make any great difference in the temperature spread between surface and the depths—even a drop of ten or fifteen degrees at the surface would still leave sufficient difference to work the thermal motor.

While a million, two hundred thousand dollars was spent on developing the plan and building the three tubes, the cost of a single tube is not particularly heavy. The one successfully launched cost $30,000 to build. If the plan works the cost of tubes would be much less than that of dams and penstocks for ordinary hydraulic power plants.

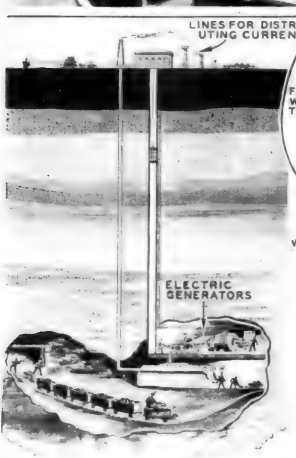
The search for new sources of power is one of the most absorbing of scientific hunts. The dream of releasing the latent energy in the atom—energy sufficient to make one drop of water drive a liner across the ocean—is still far in the distance, but there are other sources of power which are being tapped.

In California and Italy steam from volcanic vents, or fumeroles, is being used to run machinery. In Iceland the natives are piping the hot geyser springs to heat their homes. An adaption of the Claude plan might be used there to combine the heat of the geysers with the ice water from nearby glaciers and produce an abundance of cheap power.

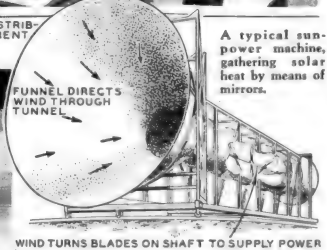
The world's greatest reservoir of natural volcanic energy is owned by the United States, but probably never will be harnessed. For it is situated in the Valley of Ten Thousand Smokes, far out in the Aleutian islands, off Alaska, where literally thousands of fumeroles give off hot gases and boiling water the year around.

The earth offers an inexhaustible supply of power, if it can be tapped. A shaft a few

A typical sun-power machine, gathering solar heat by means of mirrors.



A future possibility—burning coal in the mines to generate current, thus saving transportation.



A German attempt to harness the winds. Wind power is unsatisfactory because breezes may die down at any moment.

miles deep would penetrate a region where temperatures are so high that water poured down the hole would come back as superheated steam. Even in mines a mile deep the temperatures become almost unbearably high. Gold workings on the Rand in Africa are so hot that even natives break down after a few months, and inner world heat has been a source of trouble in the Montana copper mines.

(Continued on page 176)

Balloonist SEEKS 10-MILE

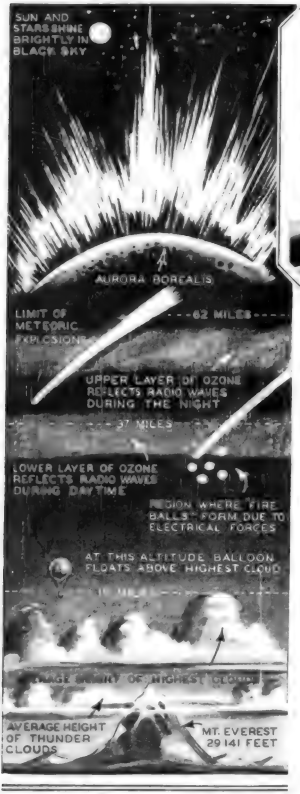
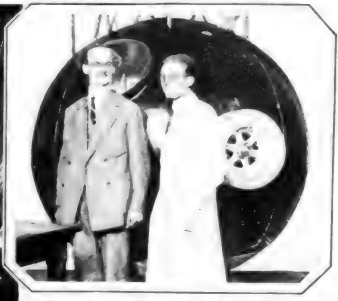


Diagram of the earth's atmosphere, as science now believes it to exist. Prof. Piccard expects to study cosmic rays at extreme altitudes.



Prof. Auguste Piccard, at left, with his assistant, M. Kipfer, before the globular balloon basket.

IF Auguste Piccard, famous Swiss scientist, now living in Augsburg, Germany, succeeds in ascending ten miles in his hermetically sealed balloon car some time in the near future he will have reached a height never before penetrated by man, and a height at which an observer in an open car, even though sustained by oxygen apparatus, would die instantly.

Almost ten miles straight up, the dream of scientists for many years, is Prof. Piccard's objective. In his first attempt, in September, the balloon failed to leave the earth because of a miscalculation of the weight of car and load. Insufficient hydrogen had been provided to lift the weight, and as an additional supply was not immediately available the gas bag had to be deflated and the attempt postponed. It is possible that the equinoctial storms may force a postponement until spring.

The Piccard attempt is unlike any balloon ascension ever made. Not only will the professor and his assistant be sealed in an air tight ball, with air pressure maintained at ground density, but the balloon will have sufficient gas capacity to care for part of the expansion as it ascends into lighter air, and so retain enough gas to bring the scientists safely back to earth. Prof. Piccard's object is to study cosmic

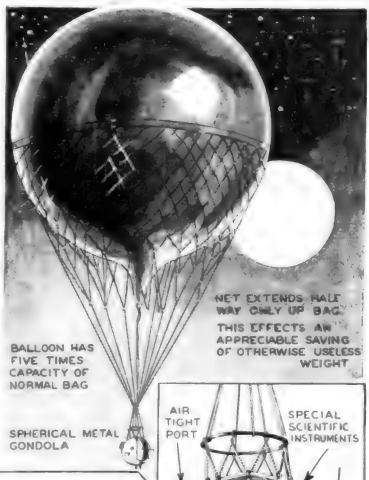
Height in METAL Basket

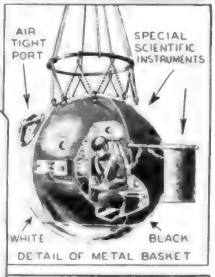
rays miles above the earth, and perhaps to learn the secret of releasing atomic energy.

The bag, one of the largest if not the largest spherical free balloons ever built, has a capacity of 23,000 cubic meters, but in the September attempt was filled only to 7,000 meters. That would prevent any gas losses from expansion until the bag had ascended into air less than one-third the density at ground level.

Losses from expansion and the consequent high speed of the balloon in descending has always been one of the big problems in high altitude flights. The late Captain Hawthorne Gray, U.S.A., was forced to jump out with a parachute at 8,000 feet on one of his high altitude trips, thus losing a world's altitude record, as the Federation Aeronautique only recognizes records when the pilot returns to earth with his craft.

(Continued on page 173)

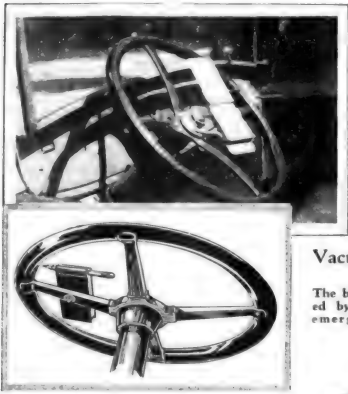




Prof. Piccard inside the gondola, with some of the scientific instruments to be used in guiding the flight and making scientific observations. The ball itself is fitted with a parachute to lower it safely in case of an emergency. Note the air-tight manhole.

All possible methods of saving weight are used in the Piccard balloon. The light aluminum ball in which the aeronauts will ride is painted white on one side and black on the other. When the black side is turned toward the sun, heat is absorbed; when the white side is turned heat is reflected and the interior of the ball is cooled. The ball is air-tight so that the pressure inside can be maintained.

Busy Builder Writes Ideas on Steering Wheel Memo Pad



A Los Angeles builder bolted this memo pad to the spider of the steering wheel to write down ideas that came to him while driving.

A WELL known Los Angeles builder, finding that he had no place to write down the many bright ideas that came to him while he was driving from one job to another, devised a memo pad on the steering wheel of his car to take care of the situation. This pad consists simply of a small tablet and pencil in a commercial aluminum holder bolted to an arm of the steering spider, as shown in the photo at the left. It is a useful device which can easily be duplicated by anyone for a few cents.

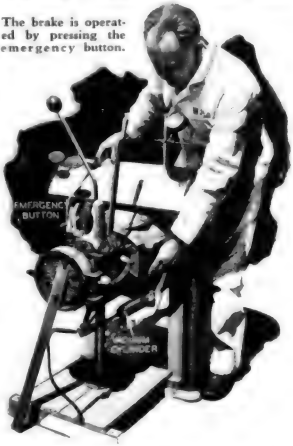
Giant Typewriter Weighs 14 Tons

A MAMMOTH typewriter—an exact duplicate of the smaller machine—standing eighteen feet high and weighing fourteen tons was recently placed on display in Atlantic City's auditorium convention hall. The huge machine, shown in the photo below, is said to have cost $100,000 and required three years' time in construction. All parts of the huge machine work just as in an office-size typewriter.

This mammoth typewriter weighs 14 tons.

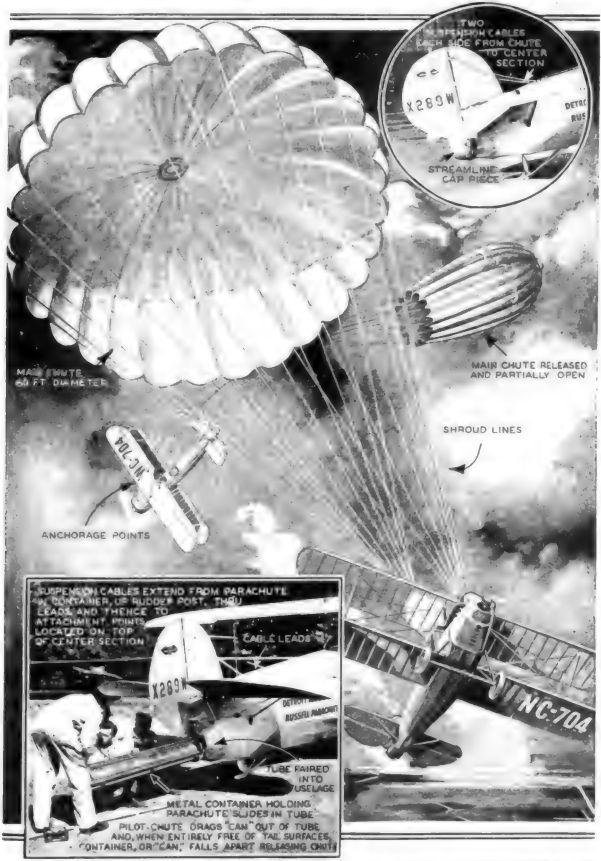
Vacuum Cylinder Operates Brake

The brake is operated by pressing the emergency button.



A VACUUM cylinder with a plunger attached to the emergency brake lever and actuated by touching a button which opens a two-way valve connected with the exhaust manifold makes the essential parts of an automatic emergency brake recently invented by a western mechanic. The button is placed directly under the foot brake pedal and is touched only when a fault in the main brakes permits the pedal to reach the floor.

New Way to Lower Plane by 'Chute



A new type of airplane parachute, shown in the drawings above, recently proved successful in tests.

Light Planes Prove Hit

Here's the authentic news of the National Air Races, written by an expert who was pylon judge and scorer during the Chicago sky rodeo. With every type of ship entered in these contests, the light plane walked off with most honors.

Ben Howard, St. Louis mail pilot, with his midget plane in which he won four races at Chicago.

WELL, you light plane fans, what do you think of a little twenty horse powered glider stepping out and being the panic of the national air meet? That's just what happened at Chicago this year.

As 1930 has been the year of gliders and light planes it perhaps is only fitting that the hit of the show should have been a little job with a pair of opposed cylinders stuck on its nose. If you haven't seen it you want to grab the first chance to take a close-up look at the Aeronca, which is an abbreviated way of saying the ship built by the Aeronautical Corporation of America. The Aeronca is a parasol job, with a simple fuselage of triangular section, and a pair of 12-inch Goodyear air wheels instead of shock absorbers and the usual landing gear.

One day when the pilot was doing a trial spin around the

A Pitcairn-Cierva Autogiro rounding the pylon on an exhibition flight at Chicago. This model has a top speed of 140 miles an hour and flew from Philadelphia to Chicago in seven hours.

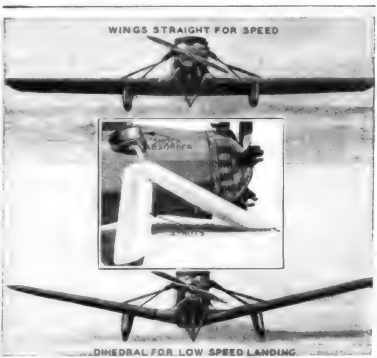
# of AIR RACES

by JAY EARLE MILLER

closed course before a race he came past our pylon at about 75 feet, cut the gun, glided along for a few seconds while he talked to us on the ground, then gave her the gas and scooted away. How would you like to own a ship like that?

And, speaking of light planes, our own Ed Heath walked away in a five ship race one day and won by a tremendous margin. In fact, Ed lapped the last ship in the first four laps, which means his Heath Parasol did twenty miles while the other job was turning off fifteen. Ed's ship, by the way, was powered with a two-cylinder Bristol while the low wing job he lapped had a four-cylinder Heath engine.

Trying to tell about everything interesting that happened at Chicago is going to be a big job. The outstanding features were a half dozen or so of unusual new types of ships, the appearance of four of Europe's greatest fighting pilots in daily exhibitions of aerobatics, the performance of a trio of auto-giros, dozens of daily glider flights, including Captain Frank Hawks in his airplane-towed Eaglet, and Jimmy Doolittle, Captain Hawks, Al Williams and Captain Page in their high speed jobs.



Waldo Waterman's "fool-proof" plane. The wings are adjustable from the pilot's seat, being hinged close to the fuselage. The landing wheels are rigidly attached to the wings.

Ben Howard, St. Louis night air mail pilot, went home from the Cleveland races last year resolved to build a ship to compete in the 1930 events. He bought a drawing board, pencils and paper and got a high school boy to help him. Stumped on a problem in calculus, they knocked off for two weeks while the school lad went to night school and learned enough calculus to solve it.

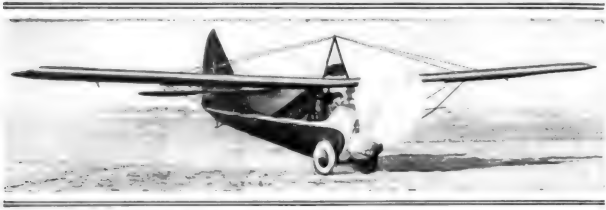
"Pete," the little, white, low wing, Cirrus engined, 90 h.p. job, was the result. In his first race the motor balked, and Benny was last off the ground. He passed everything but "Speed" Holman in his Laird, and then the judges disqualified "Speed" for cutting a pylon, so Benny got first. By the time he had won the first race on the last day he had taken five firsts and a second, and annexed $4,150 in prize money. It cost about $4,200 to build "Pete."

Then Benny entered the Thompson Trophy, $10,000 Free for All. There were four entries from 60 to 100 miles an hour faster than "Pete," including Captain Arthur Page's 800 h.p. Hawk, Capt. Frank Hawks' Mystery Travelair, Jimmy Doolittle's Mystery Travelair, flown by Jimmy Haizlip, and "Speed" Holman's new Laird, just finished the night before and test hopped that morning. And there were only three prizes.

But Capt. Hawks quit early with a hot motor, and then, in the 17th lap, Capt. Page crashed, so Benny got third money—$2,000.

Not bad to make $6,150 in one week with a $4,200 job!

The unusual types included J. S. McDonell's "Doodle Bug," built last year for the Guggenheim competition; Waldo Waterman's variable wing cabin ship, and a queer little thing with a third wheel mounted under the nose and a short adjustable wing hinged to a mount above the motor cowling,



Stanley Huffman landing his Aeronca after a non-stop flight from New York in 10 hrs. and 10 min.

the rear edge moving up and down to form an extra stabilizer.

The "Doodle Bug" is a low wing monoplane with moderate dihedral, full length slots on the leading edge, and trailing flaps reaching from the wing roots out to the inner end of the ailerons. It can take off after an extremely short run, and climb rapidly because of the anti-stall protection of the slots, and coming down the slots enable it to come in at low speed, while the trailing flaps act as a wind brake and bring it to a quick stop. McDonell had a 250-foot circle of small flags in front of the grandstand and, placing his ship inside, took off before reaching the opposite flags, came in, landed in the circle, and stopped rolling still inside. If the pewee golf fad ever goes out of style they can turn the backyard golf courses into Doodle Bug airports.

Waldo Waterman's ship is a six place low wing cabin ship that looks a lot like a Junkers when it is coming at you head on, except that it isn't built of metal. Its feature is the adjustable wings, controlled by a strut and hydraulic piston leading from the top surface to a point near the top of the cabin. Both automatic and manual control is available. The wings are cut off on the bias, with a short stub wing attached to the fuselage. Because of that angle, when the wing tips are raised the wing swings a bit to provide both sweep back and a change in the angle of incidence, making the ship, like the Doodle Bug, inherently stable. Ordinarily the wings are practically level, showing virtually no dihedral, but in flight they frequently move upward until the tips are raised three feet or more.

Waterman claims to have flown the job two hours in a test without once touching the controls, and, after watching it in flight, that isn't hard to believe.

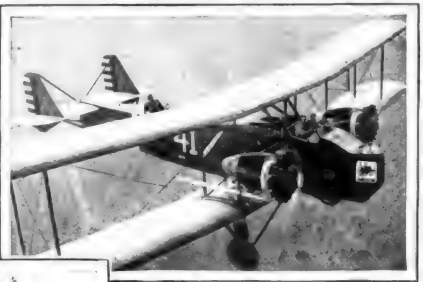
The presence of four of the greatest aces of Europe was something alone worth seeing. They were hand picked as masters of aerial acrobatics, and lived up to the name. England sent Flight Lieut. R. L. R. Atcherley, famous Schneider cup flyer, who set up a mark of around 340 miles an hour last year, and with him he brought his personal ship, a single seater Blackburn Lincock, powered with a 220 h.p. Armstrong-Siddely Lynx. The Lincock is a neat little biplane whose lower wing seems to almost rest on the ground. It actually is a full length wing passing beneath the fuselage by about eight inches, with a narrow stream lined brace filling in the gap.

Marcel Doret, king of the French dare-devils, kept the crowds breathless with his stunting. Here he is pulling out of a long power dive.

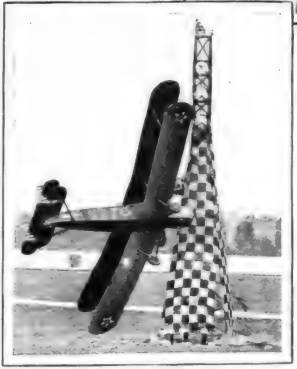
U. S. Military and Naval Air Forces Are Well Represented at Air Races

The British washed the ship out some time ago as under powered. After watching Atcherley's masterful flying an old transport pilot up in the judge's stand remarked that if that job had been washed out he would like to see a really good English plane fly.

The flight lieutenant demonstrated one of the prettiest inverted falling leaves ever seen in this country, and the way he banked his inverted turns made him the favorite foreign flyer for the pilots on the field.



Above is an excellent picture, taken in the air, of a giant two-motored Keystone U. S. Army bomber.



A Keystone bomber rounding a pylon. An idea of the size of the plane may be had by noticing the men on the ground in front of the marker.

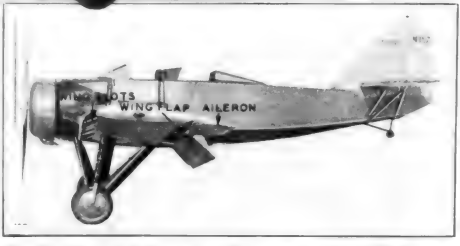
France sent Marcel Doret, with a single seater Dewoitine, an all metal parasol monoplane that took rank as just about the finest finished piece of workmanship ever seen this side of the Atlantic. And the things the fiery Doret could do with the job scared paying customers in the stands half to death and probably created a lot of new gray hairs. He's one of the best vertical climbers after a power dive ever seen, and from twenty-five feet off the ground he could climb the Dewoitine to 300 or a thousand feet without varying a hair's breadth from the absolute vertical.

The Italian representative, Marshall Pietro Colombo, flying a Breda B 19, also powered with the 220 h.p. English made Lynx motor, had a beautiful ship specially designed for advanced training in aerobatics and put up a masterful exhibition, most of which failed to impress the crowd. The trouble was that in Italy power dives and vertical zooms are barred and flyers are taught that the chief aim in aerobatics is smoothness of maneuvers from normal flying position.

The German ace, Fritz Lohse, aerobatic specialist of the Junkers Flugzeugwerke, had tough luck, and washed out the landing gear of his ship the first time he tried to take off, his motor conking just after he left the ground. The race committee dug up a succession of ships for him, and he stunted everything from a Great Lakes with an American Cirrus engine to a Stearman. The high light of his show was the day he looped and rolled and spun a three place American built Savoia-Marchetti amphibian.

As for our own fighting flyers, represented by eighteen army pursuits, 18 navy ship board Boeing fighters, nine army bombers and nine marine Boeing fighters, they showed the foreign visitors a few new things. There was a trio of navy pilots from Antacosta whose specialty was flying in close V formation with the leader on his

The McDonell "Doodle Bug," which can land in a 75-ft. circle.



The "Doodle Bug" is shown above in low speed position with slots open.

back and the two rear planes upright. Then they dived and looped, the leader doing an outside loop starting from the bottom, and the followers normal loops. Another of their stunts was a leap frog game, the three planes flying in echelon, the leader on the left rolling up and across, and dropping down into position as rear plane on the right. It took perfect timing to turn the trick.

The three auto-giros, one a small old model built in England, one last year's American built ship, and the third the newest model from the Pitcairn factory, put up a good show. The new model, by the way, has a top speed of 140 miles an hour and flew out from Philadelphia to Chicago in something less than seven hours, which isn't bad time for any moderate power ship.

This year's show was marked by the increasingly large number of low wing jobs, ranging from Col. Lindbergh's Lockheed Cirrus and Captain Hawks' and Lieut. Doolittle's Travelair "mystery ships" down to the smallest of light planes. And the split landing gears of the low wing jobs seem to get wider and wider with every new model. If they keep on for another year or two at the present rate wheels will be under the wing tips.

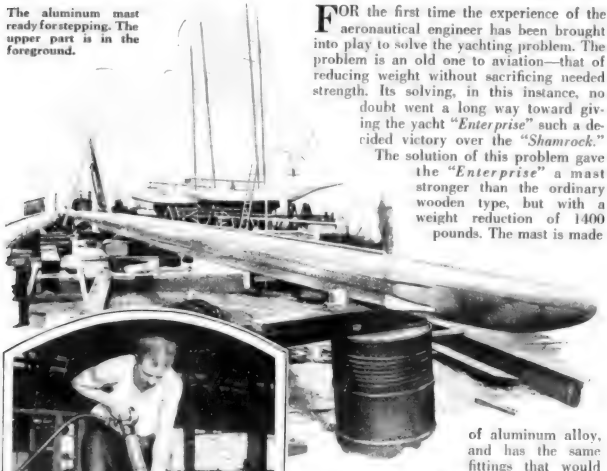
And now for the funniest thing seen at Chicago. It was Al Wilson's old Curtiss pusher, built in 1920 from plans of the late Glenn Curtiss' 1911 machines, but powered with an OX-5 engine. If you can remember the pre-war Curtiss, and imagine it with not only plenty but more than that much power, you have some idea of how Wilson could kick that box kite crate around the sky. Some pilots fish tail, but Al waggled the tail of the old Curtiss like the rear appendage of a Missouri hound dog. Half the time he seemed to be flying the thing sideways, and it apparently waggled just as well with one wing down 45 degrees as it did on the level. Its gyrations were all the funnier because, even with the extra power, it still has a cruising speed of around 50 miles an hour and went so slow that it could get into flying attitudes no modern ship could hope to assume.

And his landings, with that third wheel out in front, made more than one pilot sigh for the good old days when a grader didn't have to follow ships around replacing divots.

Altogether it was a good show, and the foreign pilots are authority for the statement that there's no country in the world able to put on one as big or as good.

Inventors Help Hold America's Cup

The aluminum mast ready for stepping. The upper part is in the foreground.



FOR the first time the experience of the aeronautical engineer has been brought into play to solve the yachting problem. The problem is an old one to aviation—that of reducing weight without sacrificing needed strength. Its solving, in this instance, no doubt went a long way toward giving the yacht "*Enterprise*" such a decided victory over the "*Shamrock*."

The solution of this problem gave the "*Enterprise*" a mast stronger than the ordinary wooden type, but with a weight reduction of 1400 pounds. The mast is made of aluminum alloy, and has the same fittings that would be found on one of wood. The lower portion consists of two half-cylinders connected by flat plates while the upper part is tapered. A truss arrangement is used inside to prevent buckling. The "*Whirlwind*" was also equipped with such a mast. The "*Enterprise*" was also equipped with specially designed machinery for handling sails and rigging.

A riveter from the Glenn L. Martin Works assembling the mast at the shipyards. Aluminum rivets are used to join the plates.

Swiss Designer Perfects New Tailless Airplane Which Is Spin-Proof

M. SOLDENHOFF, the well-known Swiss designer, has recently perfected a new tailless self-stabilized plane which attained a speed of 115 miles an hour during test flights.

This view of the plane reveals its many unusual features.

The ship is a low-wing monoplane with a nacelle containing two cockpits. An air-cooled radial motor is mounted on the rear of the nacelle and drives a pusher-type propeller. The undercarriage is equipped with three light wire wheels, the rear one being steerable in taxiing. Ailerons are mounted on the wing tips, while lateral control is secured by rudders which are mounted on the wings.

An Epic in Polar Exploration

Inflation and inspection of the huge balloon before the fatal polar trip.

One of Andree's carrier pigeons. This bird arrived with a message, 47 hours after the start, that all was well aboard the balloon.

The markers which Andree dropped as he drifted north.

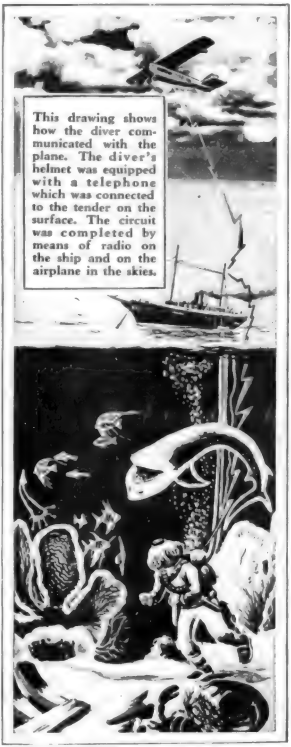
THE tragic fate of Salomon Auguste Andree and his two companions, who 33 years ago set out in a balloon from Spitzbergen to drift over the North Pole, was brought to light when Gunnar Horn, a Swedish explorer, found the bodies of Andree and Nils Strindberg, together with diaries and other relics, on desolate White Island.

Watching the start of the first attempt to reach the North Pole by air thirty-three years ago.

Diver on Ocean Floor Talks with Flyer Over Radiophone

THE latest in two-way conversations was recently held between a flyer soaring through the skies in an airplane and a deep sea diver walking about on the floor of the Pacific Ocean. Through a microphone in his helmet the diver described the scenes at the sea bottom, while the aviator described the world above.

The diver was connected with his tender, and the voice signals between the two conversants were relayed by means of radio transmitters and receivers on the tender ship and the plane. The conversation was also transmitted to a radio station on the coast, which in turn broadcast it through a network of stations to the entire nation.



This drawing shows how the diver communicated with the plane. The diver's helmet was equipped with a telephone which was connected to the tender on the surface. The circuit was completed by means of radio on the ship and on the airplane in the skies.

Australia Fights Cactus With Bugs

THREE hundred million bugs of one variety have been released in Australia, says a recent report of the Commonwealth Prickly-Pear Board in Brisbane, Queensland, as a part of that continent's long and still not entirely successful campaign to rid itself of the American cactus plant, locally called the prickly pear, introduced there years ago and which has now spread as a weed over vast areas of land once useful. The bugs, which feed upon the weed, will exterminate it quickly.

Inflated Trunks for Safe Swimming

AN inventor from Vienna has figured out a way whereby non-swimmers who like to go swimming in deep water may do so with perfect safety. He has perfected a water wing device, shown in the photo at the left, which amounts to a pair of inflated, airtight shorts or trunks. They are blown up by the small air pump when the swimmer is about to take to the water.

By means of these airtight, inflated trunks swimmers can safely paddle in deep water.

Dallas Has Tallest Welded Building

A 100 per cent electrically welded building 19 stories high, the tallest yet to be undertaken, will be built for the Dallas Power & Light Company in Dallas, Texas. The new structure will be used as an office building. It will also serve to prove the practicability of such structures.

Modern Card SHARPS

Monte Carlo is run on the square—but most big money games run by private gamblers are crooked.

by ALFRED ALBELLI

All the resources of modern science and invention are employed by the clever card sharp who sets out to fleece a wealthy victim. You yourself, if you play cards, are fair game for a crooked player unless you are forewarned of his methods. In this article Mr. Albelli exposes the clever methods which enable the crooked gambler to cheat without his victim being aware of what is going on.

ONE night last August four men sat down to a congenial game of stud poker in a Saratoga hotel suite, where one pays fifty dollars for a night's lodging with benefit of bath.

The spotlight in this little drama, which was cleverly set, was focussed on Mr. A, real estate operator whose reputation swings from coast to coast and whose millions can raise the blood pressure of any card sharp or confidence man with hardly any effort.

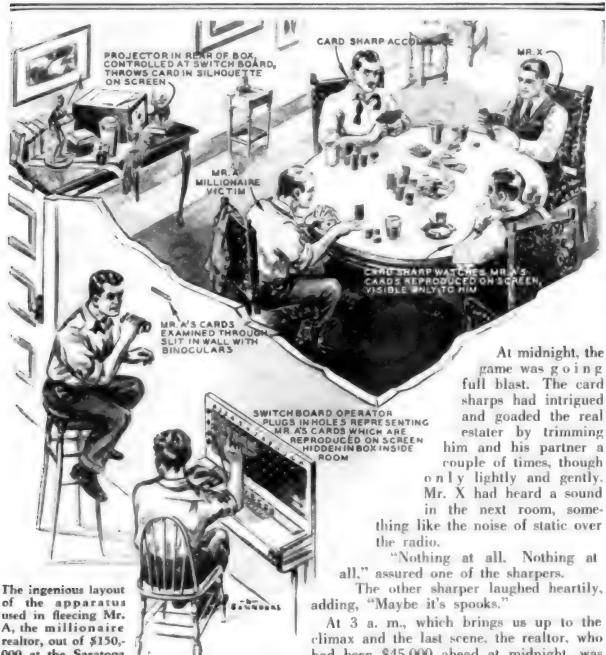
His partner, less affable but with a much shrewder wrinkle in his brow, must remain for a moment a man of mystery. He will become known to you just before the final curtain drops on this play. Just to facilitate matters we will call him Mr. X.

The other two players, who were actual actors in this real life melodrama, were two notorious card sharps whose victims were strewn across the country's smartest spas and clubs and across the Atlantic where they had found their prey on ocean liners, Deauville, London, Monte Carlo and Paris.

Now let us sit back and behold the unraveling of one of the most spectacular acts in which perverted and criminal mechanical ingenuity is at work. John E. Armstrong, superintendent of the Saratoga racing spa police department, declared that the operations of those card sharps, made unbeatable by the inventions which they introduced, were without parallel.

Everything is on the level as the cards are dealt. There are no marked cards. The green baize tablecover is unmolested.

Use SCIENTIFIC Methods



The ingenious layout of the apparatus used in fleecing Mr. A, the millionaire realtor, out of $150,000 at the Saratoga hotel is shown above. The victim's cards were flashed on the screen, which was watched by the card sharp, by means of a projector in the box operated from the switchboard.

Neither of the card sharps have coat or vest devices. There has not been a false cut or a false shuffle or a double discard. Nothing like that would have passed unnoticed before the business-trained eyes of Mr. A, the nationally-known realtor. And Mr. X didn't appear so dumb, either.

At midnight, the game was going full blast. The card sharps had intrigued and goaded the real estater by trimming him and his partner a couple of times, though only lightly and gently. Mr. X had heard a sound in the next room, something like the noise of static over the radio.

"Nothing at all. Nothing at all," assured one of the sharpers.

The other sharper laughed heartily, adding, "Maybe it's spooks."

At 3 a. m., which brings us up to the climax and the last scene, the realtor, who had been $45,000 ahead at midnight, was $150,000 in the hole.

Suddenly, to the utter astonishment and amazement of his co-players, Mr. X stealthily drew a revolver and fired into the wall facing the street.

At first they thought they were being held up. But Mr. X with his gun still drawn and menacing, drew back and threatened the two card sharps with death if they budged.

Simultaneously, he threw open the door behind him and in rushed four other

Above, the player is shown dealing so that his accomplice can see all the cards dealt. Right — By holding the cards above the polished cigarette case while dealing, the player can see their faces.

men with badges pinned outside their coats.

"You are all under arrest," declared Mr. X, flashing his own badge.

In a jiffy, Mr. X dashed into the other room, flashed on the lights, and there he found two confederates of the card sharps, cringing and cowering, with arms upraised in token of surrender.

The startled and amazed real estate millionaire, on beholding the four card crooks in handcuffs, announced, in disgust, "I'm going to get out of here right now."

"Oh, no, you're not," said Mr. X, the master sleuth, "not yet."

"Why not?" he asked, in a perturbed tone, "I live right in the next suite."

"Well, I'll tell you why not," declared the detective in a soft, measured accent. "I want you to see what you're being saved from. After this you stick to nice little family bridge parties with a cent a point as your highest wager. Not even millionaires can afford to play with these fellows here."

"Mm-mm," murmured the real estater, radiating a more comprehensive wisdom.

The detective showed him a cleverly-camouflaged crack in the wall which was located just behind where he sat. He showed him a pair of binoculars through which one of the comrades was able to peer and view his cards plainly.

On another table, innocently placed in a corner, reposed a package. It might not have been anything more than the laundry. It faced one of the sharpers while it was in-

Dealing from the bottom of the deck. This trick, like all the others, is possible because the hand is quicker than the eye.

visible to the millionaire, who faced in another direction.

In the adjoining room, the millionaire was shown a complicated apparatus which looked very much like a switchboard. It contained fifty-two symbols, one for each card in the deck.

When the lookout with the magnifying glasses spotted the millionaire's hand, he related his information to the other accomplice, a highly trained electrician who plugged the identity of the millionaire's hand into the switchboard's jacks or holes,

which in turn reproduced the cards in silhouettes on a screen which to all outward appearances was nothing more than a package on the table. The screen reflector operated along the same line as a trans-lux board, where figures are projected from the rear.

Occasionally, the detective explained, the other sharp either coughed or stretched and turned toward the box-screen and got a good glimpse of the cards which the gullible real estate man was holding. For these two super-sharks, the rest was easy. They went about their fleecing with their usual efficiency.

By manipulating an important card with the fingers as shown above, the dealer places it on the bottom, from where it is dealt. Left—Here a card is being palmed; that is, held in the palm of the hand till needed.

In dealing seconds, as shown here, the player deals the second card, which is a good one, to himself, while dealing the top one, which is worthless, to his opponent.

The acquaintanceship of these four men was struck up all in one day at the races. The realtor, after some inveigling, said he was just aching for some stud poker. Mr. X who had been assigned to keep a weather eye for a certain ring of con men and card manipulators, convinced them all that he was a big shot, and the millionaire agreed to take his I. O. U. pending the execution of a big business deal.

Although the raid at the Saratoga hotel last August was probably one of the most sensational ever carried out, and the apparatus the most complete and elaborate to have been confiscated, police and detective bureaus throughout the country are continually encountering similar cases.

The modus operandi of the flim-flammers at cards is as varied and as fascinating as the game itself. House detectives in the big city hotels of this country and on the continent, though they are acquainted with illustrious card vultures through an underground information system, are kept busy by the wolves who single out innocent prey in hotel lobbies. The tired business man in quest of a little recreation is first engaged in idle chatter about the tariff or home-town affairs, and the invitation to a poker session eventually comes to the surface.

If the logs of ocean-going steamers contained the episodes concerning victims of card jugglers, there would be neither space

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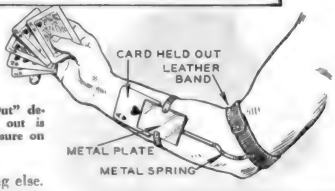
Above — In a game played on the square, the coats of the players are removed and the sleeves rolled up as shown.



Right — The "Hold Out" device. The card held out is thrust forward by pressure on the metal spring.

nor time for anything else. The concerted campaign to exterminate these crooks has gone far, but the clever ones have survived and are still plying their nefarious trade openly and recklessly.

Some idea of the methods of the professional card sharp may be gleaned from an episode which occurred recently on one of the trans-Atlantic liners. A clean-shaven man, whose tender eyes and immaculate appearance made him look like a preacher, was promenading along the deck and came to a point where he beheld a man poised for suicide. The clerical-looking gentleman seized him just in time to prevent him from jumping overboard and ending everything under the waves.

The prospective suicide explained that he had lost his entire fortune to card sharpers aboard and didn't have the courage to go back to his state-room to face his wife. This was their honeymoon.

His savior pleaded with him to brace up and told him that he would help him without any lack of propriety or further injury to his sensibilities. He was told to go to his stateroom in an hour, as he gave him the number. Then they separated.

The preacher-looking stranger nonchalantly strolled into the salon where the desperate man said he had lost his fortune of about $25,000. He, being an old hand at poker and its byways, had little difficulty in identifying the crooks. He sauntered up to a table where they were marking time pending the arrival of another lamb for shearing and casually remarked, "I don't suppose a fellow like me has a chance of getting into this game?"

When you see a player dealing the cards in this manner, it's time to get suspicious. With the coat sleeves down and the cards arranged as shown, any number of cheating tricks can be pulled.

At this point it is appropriate to explain that the man to be feared in a game of cards in which strangers are playing is not the one who has shifty eyes, a swarthy complexion and smart suavity. On the other

(Continued on page 166)

Studebaker Builds World's Largest Auto — 41 Feet Long

Mammoth auto is located outside the Studebaker proving grounds. Compare it with the roadster.

AT THE entrance of the Studebaker proving grounds, in South Bend, Indiana, stands the world's largest automobile—so large that an ordinary car can be placed under its hood. This mammoth car, shown above, weighs five and a half tons, and is 41 feet long—two and a half times the length of the ordinary car.

Gas Sounds Cable Damage Alarm

Gas pumped into the cable leaks out at damaged section and sounds alarm at the repair station.

THE Pacific Telegraph and Telephone company has recently put into use a method to locate cable troubles which uses gas as the detecting agency. Pressure of escaping gas, which has been pumped into the cable, sounds an alarm which sends a trouble shooter on his way to repair the damage.

Convenient Holder for Telephones

WHEN a telephone man installs a phone in your house he usually leaves its disposition up to you. Usually the phone is placed on a stand or left to shift for itself on the edge of the desk, where it usually gets knocked off. Manufacturers have solved the problem, however, by the invention of a device which they call the Telepho-Safety, which is simply a holder into which the phone is placed when not in use. It can be fastened to the edge of the desk, to the top of the phone box, or on to the wall.

When not in use the phone is placed in the holder, which is fastened to wall or desk.

Atlanta Landscape Artist Has Leafy Zoo in Front Yard

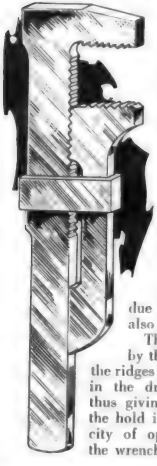
These leafy animals were shaped from hedge by Mr. Pitman.

IF YOU were suddenly to come upon the shadowy forms which ornament the front yard of Mr. D. A. Pitman, of Atlanta, Ga., in the dark of night, you might, at first thought, take fright and beat a hasty retreat, thinking you were lost in some African jungle infested with every species of wild animals. Daylight, however, would reveal that these forms are merely hedges, which Mr. Pitman has cut and trained into shapes of wolves, sheep, dogs, elephants, and other animals.

Decrease in New York Taxicabs

LICENSED taxicabs in New York City have decreased from 34,675 in 1927 to 19,918 in 1930, this being due, it is believed, to a law which restricts them to 18,000.

Wrench Grips With Ridges



A MONKEY wrench which dispenses with the usual screw for tightening jaws, and uses instead a lock strap, as shown in the drawing at the left, has recently been placed on the market by a German manufacturer. The chief advantage of this device is that it enables a machinist to adjust the width of the jaws more quickly. Slipping and sticking due to rust and wear is also avoided.

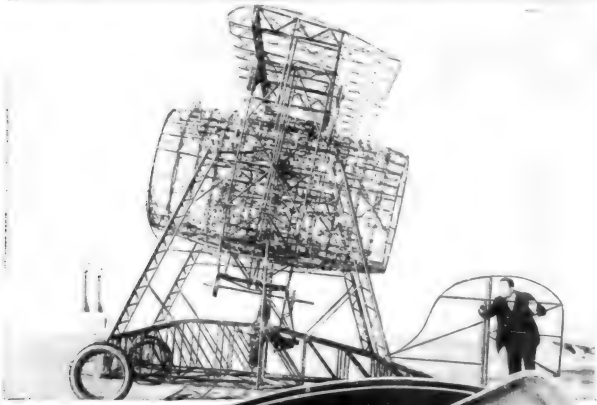
The jaw is held firm by the strap which grips the ridges in the manner shown in the drawing at the left, thus giving a firmer grip as the hold is tightened. Simplicity of operation will make the wrench of great value.

Movie Stars Play Miniature Golf

Fay Wray, popular film star, is seen here about to take a long putt on a miniature golf course.

MOVIE stars in Hollywood, being human like the rest of us, are going in strong for miniature golf. In the photo above, Fay Wray, well known film star, is to be seen indulging in a game during a period of intermission.

The World's Strangest AIRPLANE

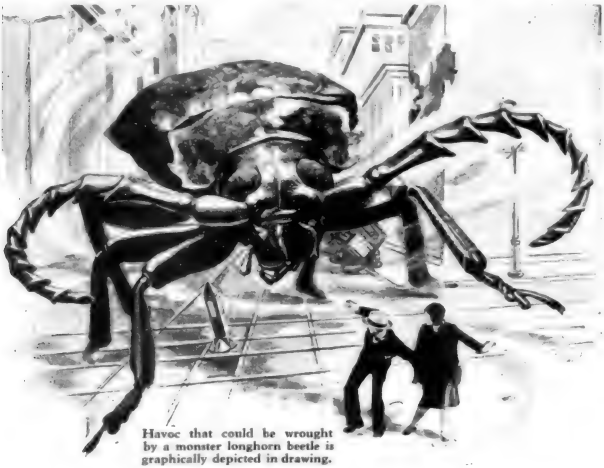


The framework of Paul Maiwurm's "Flyworm," before wing and rotor-barrel have been covered with fabric.

How the strange airplane will look when covered and completed.

WHAT is most certainly one of the strangest airplanes ever built is shown on this page and on this month's cover of MODERN MECHANICS AND INVENTIONS. The plane, which its designer, Paul Maiwurm of San Diego, California, has called the *Flyworm*, will have no propellers to pull it through the air. Instead, it will depend on a barrel-like tube between the wing and the fuselage, fitted with spiral fins which, when the tube is rotated rapidly, are expected to act like a screw in forcing the craft through the air. Both forward thrust and upward pull are expected to be provided by this unique method. The tube, which is six feet in diameter, will be powered by an 80-horsepower air-cooled motor. The pilot and passengers sit in a fuselage shaped like an airfoil. Lateral control is secured by a conventional rudder. It is expected that the plane will be completed and test flights made sometime in the near future.

Will Monster Insects



Havoc that could be wrought by a monster longhorn beetle is graphically depicted in drawing.

Fantastic as it may sound, it is a scientific possibility that in some distant age man will disappear from the earth, his food supply ravaged by insect hordes who remain to dominate the world. Mr. Miller's article is a fascinating discussion of a subject which has been made increasingly important by the many existing crop-destroying pests.

A WORLD ruled by giant insects, with the last remnants of the human race as slaves is one of the favorite devices of one school of fiction writers.

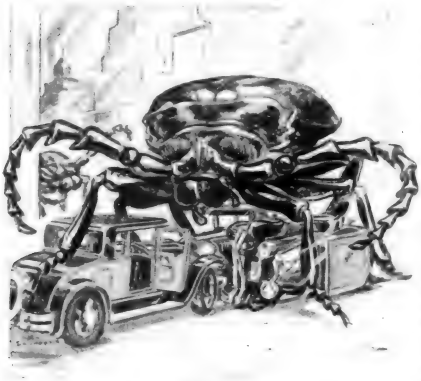
Fantastic? Not at all. Thoughtful scientists recognize that as one of the possible endings for our civilization. In fact, all past history indicates that when, and if, the present civilization comes to an end, it will die because of an unsolved food problem, and that insects will be a contributing factor, and hence may be the survivors.

Gigantic animals once roamed the earth, and perished because of climatic changes and food shortage. It is equally probable that there will be another glacial era, upsetting all food and living arrangements, and that the human race will virtually perish. Because many species of insects have, next to man, the most highly developed social instincts, they would appear to be the logical successors.

Remove the competition of man and the higher forms of animal life in the food market, and there is a possibility that the present minute insect life might develop to gigantic proportions, until a recurring food problem again wiped them out.

RULE the WORLD?

by JAY EARLE MILLER



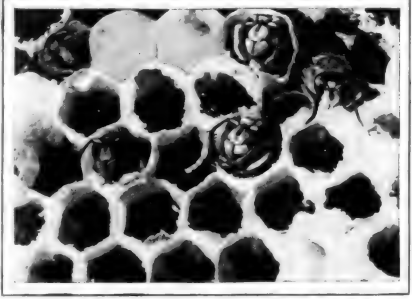
Six hundred years before the idea had occurred to philosophers in India, the Mayas invented zero. That doesn't appear so important, at first glance, but without it all mathematical calculations would be hopelessly involved. Instead of learning nine numbers, and then repeating them over and over, we would have to learn a different name for every number. To count to one million you would have to know one million different words, and what each of them stood for.

Yet, despite their advanced culture, city after city of the Mayas was abandoned because the inhabitants, knowing nothing of cultivation and crop rotation, ate themselves out of house and home by exhausting the surrounding country.

The familiar spider and fly are fearsome creatures when enlarged.

The importance of the food cycle has become increasingly apparent as science delves into the past history of the world. The Maya civilization, the highest developed in pre-historic America and rivaling the best that Egypt produced, disappeared because of food shortage. At their height the Mayas knew more about astronomy than Egypt, Greece or ancient Rome. In architecture, sculpture and painting they were equals of the old world, save for the single exception that they never learned to build a true arch, and had to rely on the corbel.

In a closeup view, the spider proves to be a formidable-looking creature. It is one of the finest engineers among insects, proved by the marvelous webs it spins.



Closeup of black and white paper wasps' home, with young wasps emerging from cells. Their lives will conform to a definite social structure. Note how perfect is the construction of the hexagonal cells.

Egypt, in Old Testament days, had a food and insect problem, until Joseph solved the periodical locust and water shortage crisis by inventing the modern system of food storage. Under his direction the Egyptians in six years of plenty laid up reserves for the seventh year, when the locusts reappeared and swept the harvest fields.

Rome fell largely because the Romans turned Italy into a region of vast country estates and pleasure palaces, and relied on overseas colonies for their food.

Recent scientific research has indicated that climate and food dictate the development of the race. The tropics, with a diet largely of fruits and vegetables, have produced a smaller, weaker race, maturing early and growing old physically at an early age. The north polar region, with a diet of fish, seals and whale blubber, likewise have produced a stunted race in the Eskimo, while the always present food shortage has limited it to a comparatively few thousand members. The whole North American region north of about 65 degrees doesn't support more than 10,000 or 12,000 natives.

Only in the temperate zones, with a balanced ration of meats, fruits and vegetables, is found the big and husky type that reached its height in the Nordic race.

Destruction of Growing Crops Make Insects a Growing Menace to Man

The food problem antedates even pre-historic man. Down in South America Professor Riggs, of the Field Museum of Natural History, discovered a vast valley fairly studded with the bones of extinct giants of the animal world. From the same plain he dug up bones of species that originated in Asia and species that developed near the southern tip of South America, probably at a time when the Antarctic continent, as the Byrd expedition recently discovered, was a tropical region.

The two groups—Asiatic monsters moving south and South American species moving north—met in what Dr. Riggs has named the Valley of the Giants, and there they lay down side by side and died. Why?

Because, as Dr. Riggs explains it, the northern invaders were eating their way southward, pressed on by hordes behind them, and the southerners were eating their way northward in search of new food supplies, and when the two groups met the visible food supply ceased to be, so they starved to death.

Destruction of food products by insects costs man millions of dollars yearly. Above is a harvestfly nymph, on acorn, with an adult fly below it.

An insects' rodeo. A stag beetle is the bucking broncho, ridden by a locust. In background are dragonfly, bald face hornet and bumblebee.

Next to the food problem the biggest danger facing the human race is the possibility of having to change its diet, its climate, or its living conditions. It took centuries to develop the stamina of the human race to live under what we call modern civilization. Diseases incident to mass living had to be conquered by building up

This reptile, a triceratops, once dominated the world, but the species became extinct when food supplies vanished. It is possible that man, in his turn, will vanish from the earth in favor of insects.

A tyrannosaurus—another victim of changed conditions which marked the end of his race. Photos by courtesy of Field Museum.

resistance to them. Yet if you introduce civilization to an Eskimo, or an Eskimo to civilization he probably will die of some childish disease like chickenpox or whooping cough, to which he has never been exposed in his native habitat. Civilized people, on the other hand, succumb wholesale to the diseases of dirt, to which the backward native is practically immune. A famous doctor announced the other day the startling discovery that maggots were useful in treating gangrene wounds because they would eat only the decayed and infected flesh, and so keep the wound clean.

But when Dr. Roy Chapman Andrews came home from his second Asiatic Expedition to the Gobi desert several years ago he told the writer that the Mongols in the Gobi had been using that same system for centuries, and were immune to all the usual diseases which civilization associates with dirt and squalor. Their resistance to filth was so high that, though practically all of them have the most dreaded venereal disease, they do not transmit it to their children, and it is seldom serious to adults.

Dr. Andrews told of treating a Mongol brigand who had been shot in the leg with an ancient blunderbuss loaded with nails and rusty scrap iron. When Andrews saw the patient, gangrene was so bad and the maggots so thick a giant syringe, used to treat sick camels, was necessary to wash the wound. Yet two days later Andrews met the

Locust Plagues of Bible Days Still Threaten Many African Food Crops

Millions of locusts, familiar in the Bible for their depredations on Egyptian fields, still plague northern Africa. Photo shows a horde of insects clinging to telephone wires in Marakesh, Morocco.

patient riding his horse, well on the way to recovery.

Insects, particularly the so-called "social insects" with their highly organized communal life, appear to be practically free from disease, another reason why they may be the logical successors to humanity.

The social insects, which include all those which live together in well governed "city" nests, sharing under a communistic regime in the work necessary to support the whole nation, number thousands of species. Of 10,000 species of bees about 500 occupy common hives under one queen. Of approximately the same number of different species of wasps some 800 live in community nests. Then there are hundreds of species of beetles, ants and termites in the social groups.

The bees, because they work for man in producing honey, are highly regarded and much has been written about their marvelous organization in the hive, yet the little known ants are far superior in their civilization.

Consider that under a matriarchal form of government they maintain a standing army of soldier ants to protect the city, a vast corps of workers to build and feed them all, a corps of nurses to take care of the young, that they maintain herds of cattle—other types of insects—which they milk to augment the food supply, and that they are the only form of life aside from man that has ever imprisoned slaves to work for them.

As builders the ants, at least some species found in Africa, are far superior to man. The tallest man-made structure to date—the new Chrysler building in New York—is only some 1040 feet high, equivalent to the combined height of about 173 six-foot men. Yet ant nests, built by insects not over one-eighth of an inch high, often reach a height of 20 feet or more. That's 1833 times the height of the builder, and to equal that, men would have to build more than two miles into the air—11,328 feet, to be exact.

(Continued on page 202)

Air Cleaner Keeps Water and Dust From Plane Motor

Above is the cleaner-booster mounted below a 600 h.p. seaplane motor. Commander Smith, the inventor, is shown in the picture. At left is shown the air scoop assembly.

A CLEANER-BOOSTER in which there is no movable part has been developed by Commander Karl Smith of the U. S. Navy. Tried out recently, it permitted aircraft to take off in heavy seas or on dusty fields without the usual ill effects.

The booster is mounted directly below the engine in the propeller blast. Air comes in through a coarse screen which stops rocks and heavier particles and breaks up water. As it strikes helical vanes it is put through a swirling motion which throws dirt outward. A slight vacuum is created which sucks the dirt out and discharges it at the rear.

Water has a tendency to stick to the skin of the shell, and as it passes to the rear in a whirling motion it is caught by the external lip which has an annular water ring. This discharges water through a tube provided for that purpose.

"Screwnail" Anchors Sheet Metal

Nail's threads hold the metal securely.

A VAST improvement upon the nails which are ordinarily used in fastening down sheet metal is represented in the new hardened, "screwnail," as its manufacturers call it. The chief advantage of this type of nail, which is shown in the drawing at the left, is that it forms a thread in the sheet metal and wood, thus anchoring the metal firmly.

New Phone Aids Business Confabs

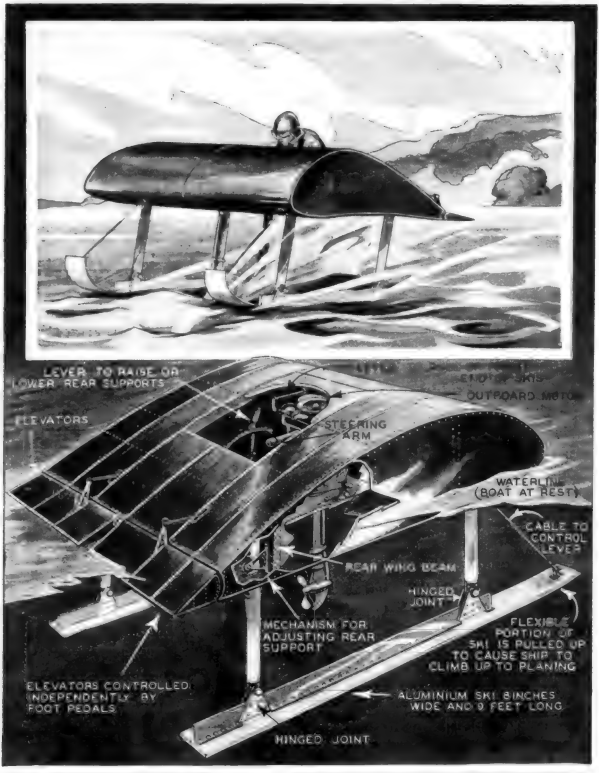
LOSSES due to business conferences may be eliminated by a new German telephone system. The boss' instrument is equipped with loud speaker, and has as many pushbuttons as there are subordinates to be summoned. A visible indicator shows when they have taken down their receivers.

Carrier Conveys Sub Overland

IN ORDER to transport the submarine *Argonaute* from a ship yard in a port in the northern part of France to its fleet headquarters in Marseilles, down in the Mediterranean, French naval engineers built a gigantic carrier for the boat and transported it overland on the canals that interlace the country. The giant carrier was towed on the trip by tugs.

The French sub, Argonaute, was conveyed across the country in the special carrier shown above.

The FREAK of the MONTH—No. 1



The oddest contraption which has been brought to our attention this month is the Outboard Ski-Plane now being constructed by C. T. Elle, of Chicago. The idea is that when the boat gets up speed the front of the skis will be raised, causing the boat to come to the surface. When wind gets under the wing it is supposed to furnish enough lift to permit the boat to skip over the waves.

Win $100 *with* Pictures

Here's a chance to win the money to help finance the motor for your light plane.

The Anzani powered Longster of the 1931 Flying Manual.

Every day Andy, the grease monkey, receives a dozen letters from fans who are building their own light planes from either their own designs or from plans published in this magazine. Here's a chance to cash in on the plane which you have built.

ALL of you dyed-in-the-wool Double-M fans, who each month devour the Shop Mail Box column, will remember that Andy, that ink-slingin' grease monkey, recently won himself a brand-new hair cut and a left-handed monkey wrench for running a haystack election to find out which was the most popular feature of your favorite magazine. When the straws had been sorted out on the hangar floor it was found that an overwhelming majority of Double-M readers preferred light plane "How-to-Build's" above everything else.

When the editors heard this news they called in the staff deducer, who after mature consideration finally came to the conclusion that if the fans want to see plans for building light planes they must build themselves a plane occasionally. Andy, who has the largest fan mail in the state of Minnesota, was again called in and cross-examined. Under severe grilling, he admitted that most of the letters were from readers who were building, had built, or were planning to build light planes.

The editors, it seems, are an inquisitive bunch. A letter revealing that John Doe was building a Baby Bullet powered with a one-lung washing machine motor only seems to whet their curiosity. They want to see a picture of this airplane which is about to revolutionize the aviation industry. Well, you can't expect a man who labors over blueprints all day to wash the wing-dope from his hands and sit down after supper to mail us a photo without some inducement.

So this brings us around to the big new light airplane contest.

For photographs and brief description of the home-built light plane, which in the opinion of the judges shows the neatest workmanship and greatest ingenuity of design, MODERN MECHANICS AND INVENTIONS will pay $100.00. Then there will be second and third prizes of $50.00 and $25.00, respectively for the next best. And those who are not fortunate enough to win a prize may still see the picture of their plane in print, for we are going to reserve the right to purchase any photos submitted, paying for them at our regular rates.

You don't have to build your plane from plans published in MODERN MECHANICS AND

of Your Light Plane

This is Ben Howard's home-built plane which won $6,000 at Chicago.

INVENTIONS or the FLYING MANUAL. You can design it yourself if you so desire, or you may secure plans from any source you see fit.

However, we've got to draw the line some place. These prizes will be awarded for YOUR plane, so please don't ask Andy, Major Arnold, Gene Shank, or Ivan Driggs to work out your problems for you. We want to see what you can do.

The contest closes at midnight, March 1, 1931. This will give you plenty of time to build your plane if you get to work now. Those who have already finished their ships, or have them under construction, can put in the time in making any changes they desire and dolling up the job for its portrait.

When the plane is completed, get out your camera or call in your local photographer and take a few shots. Be sure that you take a number of pictures showing the job under construction. Then make a selection of the best photos, write your name and address on the back of each, write out any specifications, and make sketches of any unusual features that you think are not shown properly in the photographs, and mail your entry to us. Here are the rules—Let's Go!

Rules of the Contest

For photographs and brief description of the construction of the home-built light plane, which in the opinion of the judges shows the best workmanship and greatest ingenuity, MODERN MECHANICS AND INVENTIONS will award a prize of $100.00. For the second and third best light planes prizes of $50.00 and $25.00 respectively will be awarded. MODERN MECHANICS AND INVENTIONS reserves the right to buy any other photographs submitted at our regular rates. No photographs will be returned unless such a request is accompanied by a stamped, addressed envelope, and enclosed with the submitted photographs. In case of ties, duplicate prizes will be awarded.

Anyone may compete who is a resident of the United States or Canada except members of the staff of this magazine, or their families, and holders of a Department of Commerce license above the grade of private pilot.

It is not necessary to buy a copy of the magazine or to be a yearly subscriber.

All photographs and descriptions should be submitted in the same envelope. Each photograph should have the sender's name and address written on the reverse side.

All entries must reach this office on or before March 1, 1931. They should be addressed to

Light Plane Editor
Modern Mechanics and Inventions
529 Seventh Street So., Minneapolis, Minn.

New Motorized Office and Hotel For Traveling Executive

The interior photo above shows one bed made up with chairs in place for folding into another bed. The desk is shown in the foreground. At right is shown the exterior of the bus.

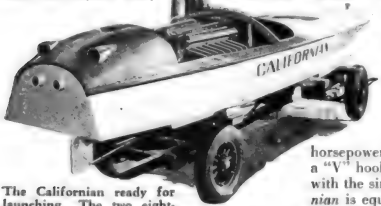
A COMPLETE executive office and comfortable living quarters have been combined into a single motor bus body by Fred D. Martin, an executive of a linen supply firm in the Southwest. He uses the vehicle to visit the branches of the company in which he is interested, thus being able to conduct routine business while en route.

Inside the vehicle are four comfortable, deeply upholstered chairs, a light folding desk, which likewise serves as a dining table; bath, cookstove, fans and other office and hotel conveniences.

At night the chairs are folded down to make two comfortable beds. Curtains sliding on rods running lengthwise the car are pulled into place when the beds are used, providing two compartments, with an aisle between. An office desk permits Mr. Martin to work while on the road.

Dick Loynes' Gold Cup Contender Follows Lines of Late Segrave's Boat

A STRIKING resemblance in design is noted between the late Major Henry O. D. Segrave's ill-fated record-breaking hydroplane, *Miss England II*, and Dick Loynes' entry in the Gold Cup races which were held at Red Bank, New Jersey.

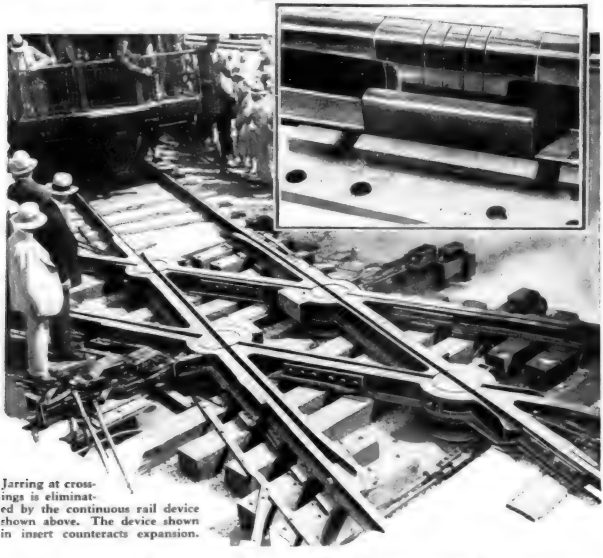


The Californian ready for launching. The two eight-cylinder engines are plainly visible here.

Both of these speed boats have broken away from the conventional twin screws, hitherto thought necessary to overcome torque, and use instead a single small propeller turning at tremendous speed.

Miss England II was powered with two engines each developing 2000 horsepower at 1200 r.p.m. while the *Californian* has two eight-cylinder engines on one crankcase which develop 400 horsepower at 4,300 r.p.m. Both boats used a "V" hookup to connect the two crankshafts with the single propeller shaft. The *Californian* is equipped with a separate carburetor for each of the sixteen cylinders.

Inventions Reduce Rail Noises



Jarring at crossings is eliminated by the continuous rail device shown above. The device shown in insert counteracts expansion.

Glove Increases Swimming Speed

TAKING a hint from the propulsion mechanism of ducks, an ingenious inventor, desiring to increase his swimming speed, has perfected a "web-fingered" glove, as shown in the photo at the left. The glove fits tightly over the hand, and when stretched out adds to the surface of the hands as they move through the water, thus giving the stroke greater power in the water.

These web-fingered rubber gloves greatly increase a swimmer's speed and are very flexible.

THAT nerve wracking jar which occurs every time a train wheel passes over an intersection of tracks or a break in the rail is at last going the way of all noise nuisances. A new device, an invention of a Los Angeles engineer, Mr. W. H. Whalen, has recently been perfected which provides a continuous rail at the crossings. In the center of the four track intersections there is an electrically operated turn table device, which forms a practically solid rail, this eliminating the costly hammerings of wheels as they strike the gaps.

One of the greatest problems that engineers have to contend with is expansion of the rails due to heat. This difficulty has been solved by an invention, shown in the insert above, which is placed between the rails to counteract expansion and contraction.

Nutty Inventions Paid

Mike and Ike (they look alike), Boob McNutt, and hundreds of other familiar characters trip off the Goldberg drawing board into the homes of some ten million Americans every day.

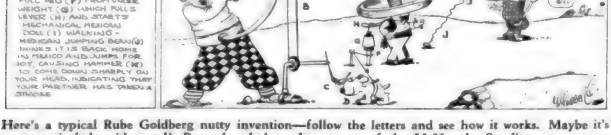
"HOW did you get that way? How do you do it? How do you get away with it? How do you get them to fall for your stuff? How are you, anyway?"

There you have the barrage of questions which are popped at me every day of my life, including days when the game is called on account of rain. It's a good thing a humorous cartoonist has got a sense of humor. Or I might borrow from that jolly English expression and say, "It's fortunate my humor is not bad."

For that segment of the citizenry which has been blissfully unaware of my existence all these years, let me say that my profession, by extreme choice, is that of cartoonist, having brought into this world such specimens as Boob McNutt, Foolish Questions, I Never Thought of That, and the type of cartoon which presents a series of contraptions working in successive order to make up an invention to solve man's earthly difficulties.

This latter brainchild has proved my most gold-bearing device. In this field I have been able to turn ink into gold by a few strokes of my pen.

In black and white, I consider myself the most prolific inventor in America today. I figure I turn loose about 400 inventions a



Here's a typical Rube Goldberg nutty invention—follow the letters and see how it works. Maybe it's not practical, but it's good! Reproduced through courtesy of the McNaught Syndicate.

Me A Million

by RUBE GOLDBERG
Famous Cartoonist
as told to Alfred Albelli

Four hundred inventions a year, all of them of exceedingly "nutty" brand, qualify Rube Goldberg, the famous cartoonist, as one of the country's most prolific and best paid inventors. The fact that his inventions never get beyond the pen and ink stage doesn't prevent him from "cleaning up" from them.

Rube Goldberg, cartoonist, as he looks today.

year. And mine are not simple pieces of apparatus, either. As I gaze upon an invention, done in ink, of course, of an appliance which a husband may wear at the dinner table, I would guess that a first class engineer would have to spend a whole month in a machine shop before he could make the living and breathing duplicate.

This bit of mechanical folderol which I am now perusing looks like a strait-jacket which is strapped around a man's body after he is seated at table. Jutting out from its sides are prongs and clampers which permit him to eat his soup with his right hand, hold his bread in his left, while the other gadgets are automatically pouring the coffee, putting two pieces of sugar in the cup, then the cream, holding the plates for the next course aloft, and directing things and the wife in general.

You've got to admit that's an invention that any man could use. Especially when he gets home from a heavy day's work and is famished and his fraulein fetches the fodder at a snail's pace. To slap together that "Quick Lunch" machine for everyday use would run into money. So the farthest it gets is in print. My invention in ink goes out to about ten million newspaper and magazine readers.

Most of the time I wrestle with very human problems. I spent a long time inventing an instrument for removing olives from long-necked bottles. Then there was another one for retrieving soap which slipped away from you in the bath-tub. I've got to admit, however, that there's one stickler that I haven't been able to overcome yet. That is, how to get your nickel back from a telephone coin box after you've failed to get a number.

I don't suppose I could make any one believe that I draw up all those crazy inventions without having had a knowledge of mechanics and having spent considerable time in the engineering field. If the truth

Two More Examples of Goldberg's Money-Making Nutty Inventions

must be told, my own private mechanical series started in the flesh with a course in the College of Mining at the University of California.

I went through a lot of processes myself and I came out of the other end a full-fledged mechanical engineer. I got a job in the City Engineer's office in San Francisco at $100 a month. My job was mapping sewer pipes and water-mains. And when you folks out front there behold my mechanical jig-a-ma-jigs with a lot of pipes in them, you can remain calm and be certain that I know what I'm talking about.

Back in those lean, unfruitful and obscure days I didn't see any prospects ahead better than a raise into the next higher rung, which meant $150 a month. Today my pipelines which are fearfully lacking in the geometric refinements of those dimmer days, return to me an annual flow of $50,000.

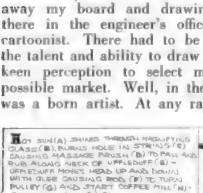
Naturally, I couldn't have just thrown away my board and drawing tools back there in the engineer's office and turned cartoonist. There had to be the elements, the talent and ability to draw as well as the keen perception to select material for a possible market. Well, in the first place I was a born artist. At any rate, the ability to sketch and draw was latent and just had to be coaxed to come out.

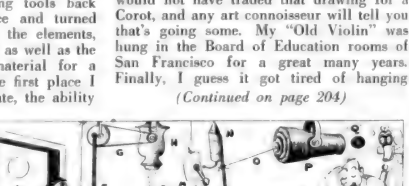
The one who lies behind the secret of my success, if I may indulge in the frank admission of my self-esteem, is Charles Beall, a sign painter of San Francisco who was the one to ferret out my artistic potentialities, as they are sometimes called. I started out as a pupil and apprentice to Charlie Beall when I was 11 years old.

I got so excited about Mr. Beall's attempts to bring out my art that I went in extravagantly for interior and exterior decorating, drawing sketches inside as well as outside the house, much to my parents' displeasure, as well as my own. Although Mr. Beall settled down to a modest sign-painting business, he was considered quite an artist. He devoted three years of his spare time teaching me the rudiments of drawing.

As the last gesture under his wing I drew an old violin, in pen and ink. It attracted wide notice. At least I thought it did. I would not have traded that drawing for a Corot, and any art connoisseur will tell you that's going some. My "Old Violin" was hung in the Board of Education rooms of San Francisco for a great many years. Finally, I guess it got tired of hanging

(Continued on page 204)





Compressed Air Tube Shoots Mail to Airport Instantly

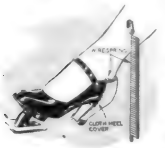
The air mail is conveyed through the compressed air tube in the metal cylinders shown above.

First class air mail is sent from the New York central post office to the air port in about two minutes through this compressed air mail tube.

UNTIL the compressed air mail tube which provides a direct high-speed connection between the New York central post office and the airport was installed, an undue amount of time was consumed in transporting the mail to the field, the delay being caused by traffic congestion. The new system, however, gets the mail there in two minutes. The first class letters are placed in the cylinders shown in the photo at the left and shot through the tube to the field by a blast of air from the air compresser.

Shoe Protector for Women Drivers

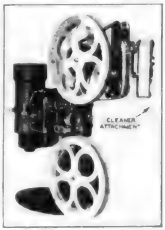
AS a means of protecting their shoes against scarring when driving their cars, women usually tie a handkerchief around their heels. A Florida inventor, however, prompted probably by chivalrous motives, has invented an adjustable protector which can be fitted around the heels, as shown in the drawing at the left. This protector is made of a metal plate covered with duck cloth and held in place on the heel by means of two music wire springs attached under the instep, and hooks.



Device Cleans Films Automatically

NO LONGER will the home movie projectionist have to clean his film laboriously and, for the most part, ineffectively by hand, for a manufacturer of photo apparatus has put on the market a device which automatically cleans a 16 mm film while it is being run through the projector.

This new device, which is shown in the photo at the right, consists of a pair of tapes which are moistened with a cleaning fluid and through which the film runs during the projection. Under well regulated pressure, the dirt and grease are automatically wiped off, leaving the film with a luster which gives a new screen brilliance to the picture.



While the film is being projected, it runs between the two moistened tapes which remove all spots.

TANK MANEUVERS

One of the latest developments in the mechanization of the army is the installation of radios in tanks for the transmission and receipt of orders. Control of tanks in action, since they were first introduced by the British during the World war, has been at once an important and difficult task, hitherto performed by officers who walked beside the tank and signalled with flags—a duty both dangerous and unsatisfactory. Modern tanks are now being equipped with radio, the company and section commanders having both receiving and short-wave transmitting sets, while the other tanks

Controlled by RADIO

are only equipped to receive. The illustration shows a tank company advancing to clear the way for the infantry. The tank in the foreground is cut away to show the driver and the company commander seated in the turret. The commander has spotted the camouflaged pillbox in the left foreground and is sending an order by radio to the tank on his right to turn and smash the emplacement. Tanks shown here are armed with machine guns, other types are equipped with small cannon.

Here's a Handy Stunt for Watering Your Potted Plants

The potted plants are connected with the pail of water by means of cloth strips or cotton cord. Capillary attraction causes the water to move slowly along the strips and into the soil.

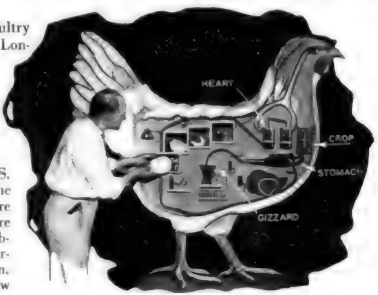
AN EFFECTIVE and automatic working device for keeping your potted plants watered can be rigged up as shown in the drawing at the left. The device consists of a number of strips of thick cloth or large size cotton cord, depending on the number of jars you want watered, and a pail or pan of water. The cloth strips are run from the water to the flower pots as illustrated. Capillary attraction causes the water to move slowly along these strips of cloth.

As many as ten or more potted plants can be grouped about a central pan of water. The strips of cloth run over the edge of the jar and are buried in the soil as close to the main plant stock as possible. The pots should be set in saucers to guard against the remote chance that the soil would become soaked. This device will keep plants satisfactorily watered for quite a while. Instances have been cited where plants have been kept watered for several weeks in this fashion.

Mechanical Hen Gives Visual Demonstration of Egg Laying Process

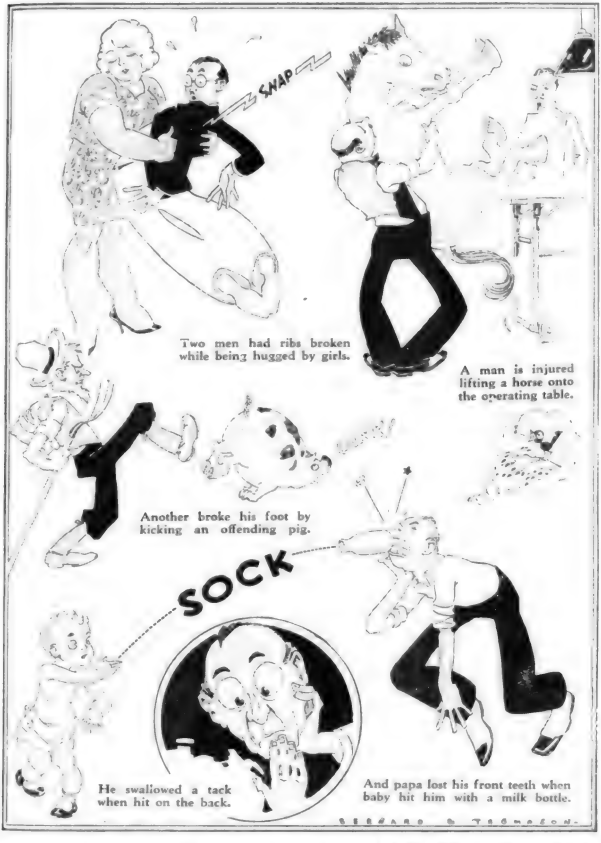
VISITORS to the World's Poultry Congress, held recently in London, were startled to see a giant hen standing seven feet tall, with her innards open to plain view, revealing the working of her internal organs to show how she manufactures eggs.

The giant mechanical hen was sent over to London by the U. S. Department of Agriculture. The interior is fitted up with an entire set of mechanical organs, which are controlled by electric motors, rubber tubes, and pulleys, which operate to show how food is taken in, ground up, digested, and also how the food is converted into eggs. The rate of laying eggs can be accelerated or slowed up by changing the speed of the motors. By means of a specially made phonograph the hen tells just what is taking place.



This mechanical hen shows the workings of the internal organs of a chicken. An electric motor controls the various parts, which operate to demonstrate the process by which eggs are manufactured. A phonograph tells what is going on.

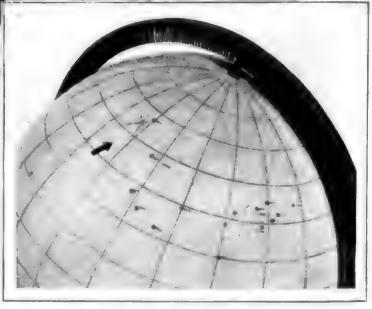
Unlikely Accidents that Actually Happened



1929 accident insurance claims, as reported by the National Safety Council, reveal a chapter of strange accidents almost bizarre enough to cast doubt on the immutability of the laws of chance.

New Ways of Fighting

Locating an earthquake. A travel-time chart, held by the scientist at the left, enables him to determine distance of a quake from a seismograph station. This distance is marked on the globe, and when three stations have reported, the exact spot of the earthquake is determined.



Arrow points to intersecting arcs which mark earthquake location.

WILL the learned men of science, with all their vaunted weapons, ever be able to do anything about the earthquake, the world's most mysterious and devastating convulsion of nature?

Of course, one might as well try to stop a quake as to control the arrival of hurricanes, typhoons and tornadoes. But there is hope for the world in the fact that the newest scientific methods follow the sensible plan of studying the natural phenomenon with greatest care before attempting to solve its problems. These methods are now being followed by the seismology division of the U. S. Coast & Geodetic Survey.

In the first place, as a basis for future studies, a catalogue has been prepared of all past earthquakes in the United States, of which records are available, and provision has been made for collecting full information regarding future felt quakes as they occur, with the assistance of a great number of voluntary cooperators scattered all over the country.

Earthquakes

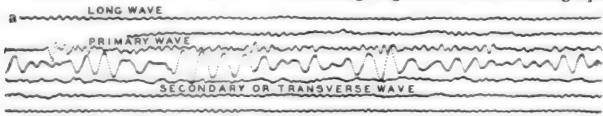
by DANIEL L. HAZARD
Famous Earthquake Expert

Mountains tumbled in the 1925 Montana earthquake. Note seemingly tiny steam shovel in foreground.

In the second place, excellent progress is now being made in providing better instruments and better time control in existing seismological stations and in securing the establishment of new stations, so that the country will be more adequately covered by instrumental records.

It is now pretty generally agreed that the great majority of earthquakes are caused by adjustment of stresses in the earth's crust. Any transfer of material, as by erosion, from one place to another, decreases the load on the crust at one place, and increases it at the other. No doubt other forces

Earthquakes Write Their Own Trembling Signatures on Seismograph



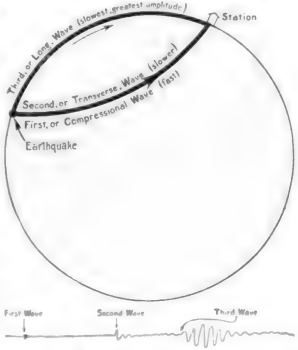
Signature of an earthquake. Three types of wave are registered by every quake, each varying in speed and time of arrival on the seismograph.

are at work all the time, causing changes in the relative positions of different parts of the crust. As a result of these movements there is a gradual accumulation of stress in the material. When the elastic limit is reached, then a break occurs, one part suddenly slips by another, and elastic vibrations are set up, which are propagated in every direction in various forms of wave motion.

In some cases, as in the California quake of 1906, the break occurs at the surface. Advantage is being taken of this fact to determine, if possible, to what extent stress is accumulating along the famous San Andreas fault, where the major movement occurred in 1906. Suitable movements on opposite sides of the fault have been connected by triangulation and leveling, and this work will be repeated at regular intervals in the future. In this way any change in the relative position of points on opposite sides of the fault either in direction or elevation can be determined.

Japan, scene of such terrific cataclysms of the past, is doing her share in investigation of earth convulsions. Particularly interesting is the work being done in that country in providing for the erection of buildings which may be expected to withstand earthquake shocks. In order that the structural engineer may work effectively in designing buildings to be erected in a region where quakes may be expected, he must have some idea of the movements and forces actually encountered in the central region of the earthquake, the amount of ground movement, vertical, horizontal and rotational, the velocity of motion, the period of vibration, and how these factors are related to the nature of the sub-soil.

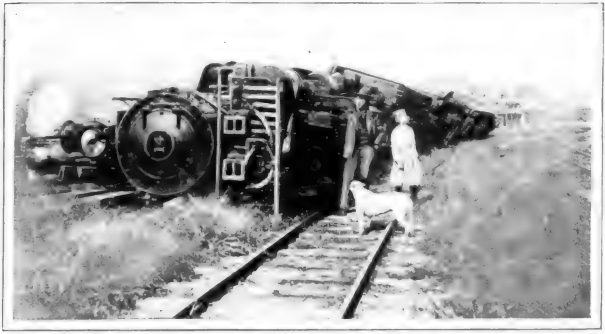
Some information on these points can be obtained from the damage done to different types of buildings by an earthquake, but so far no instrumental records of these



The first and second waves of an earthquake travel through the earth along the same path, at different speeds; the third, or long wave, travels over the earth's surface at a slower rate than the other two. This difference in speed helps experts to determine the location of the quake.

quantities have been made. Mr. John R. Freeman, a competent observer of earth convulsions, who visited Japan recently, has urged very strongly an investigation along two lines; in the first place, to develop suitable earthquake-recording instruments and install them in a region where a severe earthquake may be expected within a reasonable time, the instruments to be so constructed that they will be put in operation by the earthquake itself; and in the second place, the study of the problem in the laboratory by the use of model structures mounted on a platform to which motions simulating an earthquake may be given.

Another line of investigation to which much attention is being given is the make-up of Mother Earth, her interior, as well as her crust. This study is based on the



The California earthquake of 1906 tossed this train off the tracks with the utmost ease. Earthquakes, floods, and volcanic outbursts are natural phenomena of destruction which man is unable to control.

travel-times of the various types of waves which are set up by an earthquake. But more of this later. Suffice it to say that with more and better instruments the available data is improving rapidly both in quantity and quality.

It is by means of the seismograph that most of our knowledge of earthquake movements is determined. Now the seismograph is rather a mystery. Its ability to detect many earthquakes which cannot be felt, to tell where they occurred, how much the ground moved even if the amount is so small as to be scarcely measurable, is positively uncanny.

As a matter of fact, nowever, the fundamental principle is simple, being based on certain modifications of the ordinary pendulum. A swinging gate can be considered as a special form of pendulum. Suppose that such a gate swings from two supports and that we have neither friction nor any force acting on the gate except through its supports.

Now, if one support is directly over the other, then the gate swings freely, but has no definite place for coming to rest. If the upper support is moved a little toward the gate so that it is not directly above the other, the gate will swing just as freely, but it will have a definite position of rest.

If we substitute for the gate a weight attached to a rod, or boom, we have one type of seismograph. The weight, like the gate, is balanced at a point of rest. The earthquake moves its supports, but owing to inertia, the weight for a time remains in the same position. Actually after a time it starts to move, and this complicates the record and introduces the necessity for damping the motion.

The recording apparatus is essentially a drum revolved by clockwork or by electrical means at a constant speed. Paper is placed on the drum, either smoked paper for visible recording, in which case the record is made by a stylus, or else photographic paper, in which case the record is made by a suitably directed beam of light. The latter method is more accurate since there is no friction in the recording. The former method is more convenient in some respects since the record can be used without development as soon as it is known that an earthquake has occurred. In any case, the seismograph is in continuous operation.

A complete installation consists of two horizontal component seismometers which are set at right angles to each other, and a vertical seismometer. There are no installations of the latter instrument at the stations, scattered throughout the country, of the U. S. Coast & Geodetic Survey, since there

This is what an earthquake "fault" looks like. Many experts believe that slippage along a fault, in which portions of the earth's crust slide past each other to compensate some strain, is the cause of earthquakes.

is at present no apparatus available for the purpose. However, the Bureau of Standards is now at work on the development of a suitable instrument.

At first sight the seismograph, or smoked paper record of an earthquake, seems to be merely a confused series of waves which have little meaning. It has required many years of study by competent investigators to learn their full significance, and there are still many unsolved problems, but the fundamental ideas are not at all difficult to grasp.

Briefly, an earthquake sends out three types of waves. Two of these take the same path, either a straight line through the earth, or else a curved line, not departing very much from a straight line. But the waves travel at different speeds. So one of them gets to the seismogram first and its time of arrival is recorded. Then the other wave arrives, and it also is recorded. The difference in time may range from a few seconds to 20 minutes, but each difference corresponds to a certain distance. For instance, the time difference at Cheltenham, Md., for the earthquake of February 28, 1925, was one minute and 57 seconds, and this corresponds to a distance of 670 miles, which agrees well with the results of other stations.

The third type of wave travels along the surface of the earth at a still slower rate, and its time of arrival also helps to fix the distance. Actually the waves are reflected and are very complicated, but this is a matter which concerns the seismologist only. In practice the times of the different wave phases are obtained from tables or from curves. These vary somewhat according to the author, but in general the differences are not very considerable. If we know from surface damage the place where earthquakes occurred, then we can use a similar method to get the velocity of the waves from the known distance.

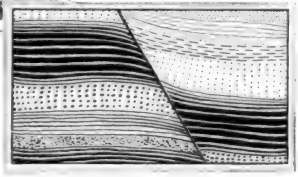


Diagram of a fault. The diagonal line indicates the plane along which rock masses slip past each other.

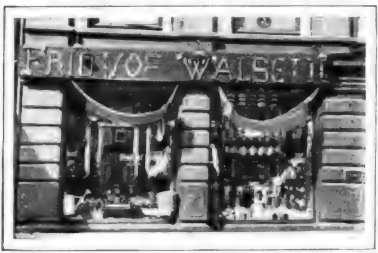
In addition to this laboratory system of studying the quake, the reports of eye witnesses are likewise considered to be important. The work of collecting such reports is well organized by our government.

Waterplaning — Hollywood's New Sport

Loretta Young, First National Star, is seen here indulging in Hollywood's latest sport, known as "Waterplaning." The odd looking plane rises several feet above the water when towed by a boat.

HOLLYWOOD seems to be a fertile field for the production of thrilling sports, the latest of which is waterplaning. Loretta Young, well known star, is shown above about to take off in one of the new planes which, when towed by a speedboat, will rise several feet off the surface without danger of catapulting the flyer out into the water.

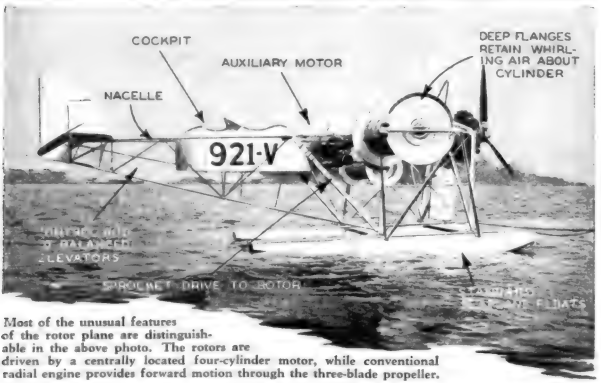
Hardware Dealer Displays Novel Sign Made of Tools to Attract Trade



An ingenious hardware dealer in Trondhjem, Norway, displays above his shop this novel sign, made of small tools.

A SIGN which kills two birds with one stone by proclaiming to the gaping world both the name of the proprietor and the nature of his wares, hangs over a hardware shop in Trondhjem, Norway. The letters of the sign are formed by an arrangement of carpenter tools—hatchets, hammers, pliers, hacksaws, monkey wrenches, spokeshaves, as shown in the photo at the left. The tools in the sign, together with the ones in the window, form a very attractive display, and it is said that business has picked up somewhat since its erection.

This ROTOR Airplane



Most of the unusual features of the rotor plane are distinguishable in the above photo. The rotors are driven by a centrally located four-cylinder motor, while conventional radial engine provides forward motion through the three-blade propeller.

THREE aeronautical inventors, presumably picked from the upper-crust of the country's roster of advanced aviation engineers, have completed and publicly demonstrated their conception of an airplane which will work on the principles which Anton Flettner applied to his famous rotor ship six years ago.

Their machine eliminates the conventional wings and in their stead it has, among other innovations three rotors which are mounted on axles on either side of the fuselage and are driven by a centrally-located, four-cylinder air-cooled engine. The span of the rotors, which are really wind-driven cylinders, is considerably less than that of an ordinary airplane.

The inventors estimate that their seaplane will lift ten times the weight of an ordinary plane of equal weight or lift area. Also they have concentrated on strength of structure and predict that the rotor plane will reduce resistance and consequently attain greater speed.

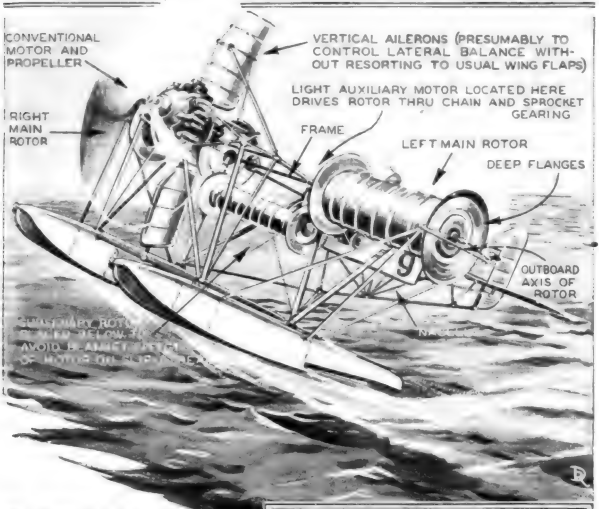
Anton Flettner, the German engineer and physicist, was the one to discover the laws concerning moving, rotating cylinders and harnessed the winds of the Atlantic Ocean in such a way by his rotor-propelled ship, the *Baden-Baden*, that he negotiated the trip from Kiel, Germany, to New York City without any other mechanical aid in 1924.

Flettner's successful crossing stimulated thought among the three inventors involved in the latest of aviation's experiments. Although the inventors were pledged to secrecy on the plane's design and make-up, others well informed in aeronautical matters were able to produce a careful and minute report of their ship's construction.

Their flying machine is made of duralumin. It resembles a seaplane in most respects. There is a single motor in the nose which supplies traction through a three-bladed steel propeller. An auxiliary air-cooled motor provides the power to rotate the cylinders. The latter supplant the wings.

The rotors are arranged in three sections, two on each side of the center longitudinal line of the machine. In the forepart there is an outrigged rudder and behind there is a small pair of tandem cockpits, together with a set of tail surfaces. Between the motor and the cockpits two long booms are

Flies WITHOUT Wings

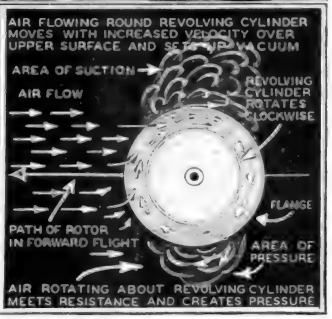


used instead of the usual four longerons.

The undercarriage is of the regular design as are the floats used. However, the pontoons are attached by "V" struts to the outer ends of the rotor axles in addition to the regular mounting.

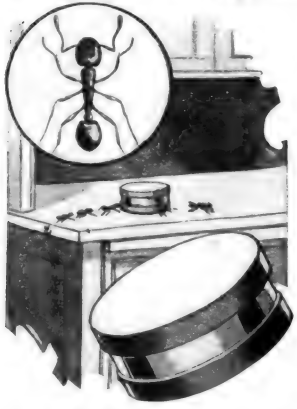
Each rotor is closed at the end by a flange which is much bigger than the cylinder itself. The diameter of the rotor is about two feet while the flange is four feet. Here it might be noted that the rotor plane will lend itself for storage purposes easier than the conventional type because of the reduction of the wing span.

The drawings show how the principle of the rotor in aviation works out.



The above diagram shows how rotor principle works.

This Pill Box Ant-Trap Exterminates The Pests Quickly



Ants are quickly exterminated with this simple ant trap, which is simply a pill box with holes cut in collar as shown and baited with poison.

IF YOU are troubled with ants around the premises and can't exterminate them in any way, get yourself an ordinary pillbox and make an ant trap, such as shown in the drawing at the left. The device is simplicity itself and will exterminate the pests in short order.

First cut several holes in the collar of the box, as illustrated, and then place the top back on. For bait, take a few pieces of bacon rind and rub them well with tartar emetic. The pieces should be very small so the ants can carry them away to their nests.

Baits made from sugar and water are also effective. Dissolve four ounces of sugar in a half pint of water, and add 30 grains of sodium arsenate and a little honey. A druggist will fix up this mixture for you at a very small cost.

Traps of this kind are successfully used by federal entomologists and are designed especially to exterminate the little red ants known as the Pharoah's ant. When in use, these traps offer very little danger to cats and dogs.

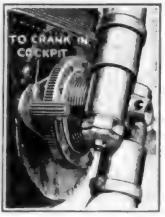
Cream Pitcher Shaped Like a Cat

A PITCHER shaped like a cat, with a spout formed by the paws, has been put on the market by an English manufacturer. This pitcher, however, has only one life. The tail, curved over the back, acts as a handle, while the head is removable for filling the creamer.

English manufacturers have placed on the market this unique milk pitcher, shaped like a cat, with the tail as handle and paws as the spout.

Invention Changes Prop Pitch

BY operating a crank from a cockpit, it is now possible for an aviator automatically to vary the pitch, and as naturally follows, the bite of his propeller when in flight. This is accomplished by the use of the new device shown in the photo at the right, an invention of two California aviators.



With the invention shown above, an aviator can change the pitch of the propeller by operating a crank.

According to the inventors, who proved its practicality in a recent test flight, the propeller cuts down the revolutions by nearly one-half, and permits the speeding up of a plane equipped with an ordinary motor by one third.

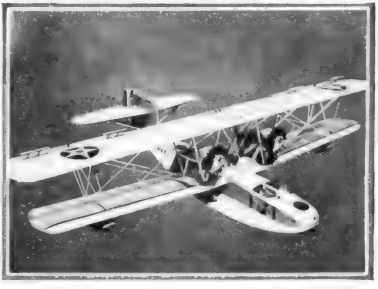
It also enables a plane to land in a space of 200 feet instead of the usual 400 feet, and to make a speed with 750 revolutions that otherwise would require about 1450 revolutions.

PLANE TALK

Edited by

MAJOR H. H. ARNOLD

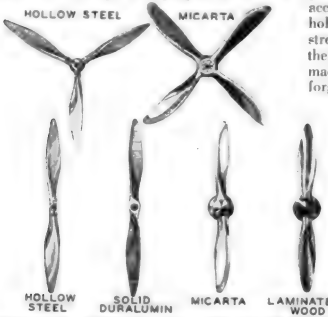
Major Arnold, who each month gives you his expert comments on the latest developments in aviation, is one of the real pioneers of the air. One of the first men to learn to fly, he received his instructions personally from the Wright brothers in 1911. He was one of the first aviation instructors in the army.



Shall We Use Solid or Hollow Metal Airplane Propellers?

THERE is no doubt but that the metal prop is here and here to stay. Its advantages over the wooden micarta or bakelite props are too numerous to mention. The problem of what the metal prop should be made of did not take long to solve for weight, the ever present bugbear in airplane construction, eliminated practically all metals except aluminum or some of its alloys. The shape of a prop is determined by two factors: efficiency and strength. Accordingly there must be compromise for the most efficient prop would hardly be strong enough for general use.

The first metal props were forged out of solid pieces of duralumin. While this type of prop has the great advantages of ease in manufacture and cheapness of production, there are many disadvantages. The prop produced is much heavier than necessary on account of the surplus metal at points where hollow construction would give ample strength. There is always a possibility of there being a defect in the metal, an air hole made by a pocket not reduced during the forging.



Here are the various types of propellers in general use.

In the army it has been found necessary to etch metal props once every six months. Metal defects first make their appearance as small hair-like cracks, innocent in appearance but capable of bringing on disaster to the aircraft. These cracks are not visible under normal conditions but show up like a sore thumb after the prop has been etched. Etching requires considerable special equipment and this is another disadvantage to the solid prop.

For years attempts have been made to produce a hollow metal prop but

it has only been quite recently that success has been attained. There were two methods of manufacture tried out: swedging from a piece of tubing and stamping out from a piece of sheet metal and welding. The hollow prop naturally is much lighter and can be given increased thickness at points where greatest stresses and strains occur. This can be done without changing the shape of the outside of the prop. By using a special lighting device within the prop, it is possible to determine points of failure due to defects in the metal or fatigue. It is possible to make a hollow steel prop as light as a solid dural one. The steel prop will be much stronger and considerably cheaper.

In swedging a prop out of a piece of tubing there is but little welding required. The tip of the prop must be welded. However, great care must be exercised to eliminate any weakness which develops along the trailing edge where the metal is bent back flat against itself. When a prop is pressed or stamped from a sheet, the weak trailing edge does not exist for this seam is welded along its entire length. Once a weld is completed it is quite easy to get a knife edge at such points as is desired for efficiency.

All metal props are made in three or more major parts—the two or more blades and the hub. This is done for ease in production, cuts down the cost and to provide a means of replacing blades when required. Furthermore such construction makes it possible to secure varied blade settings for different missions of the planes on which installed. It is now possible even to change the pitch of the blades while in flight.

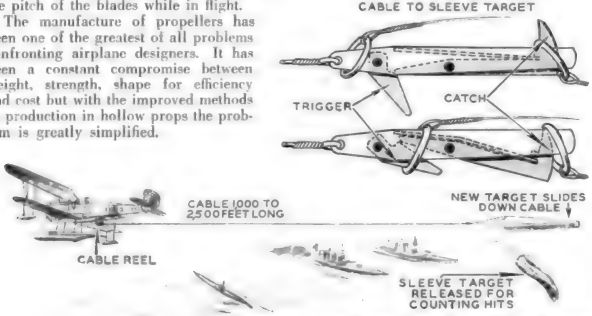
The manufacture of propellers has been one of the greatest of all problems confronting airplane designers. It has been a constant compromise between weight, strength, shape for efficiency and cost but with the improved methods of production in hollow props the problem is greatly simplified.

Automatic Sleeve Target Release

VISITORS to army flying fields are sometimes astonished to see an airplane with a sleeve target on the end of a 2000-foot cable circling overhead. Suddenly a second target will appear from the plane, slide down the cable and replace the target formerly riding at the end of the cable. The original target will seemingly detach itself from the cable upon the approach of its relief and flutter down to the ground where a waiting crew will make a record of the bullet holes.

The attachments used for releasing these targets are almost human in their actions. The top figure shows the device at the end of the cable which drags the target through the air. The target already fired on is held by a catch at the end of the device. The ring of the new target, after riding along the cable from the plane, is about to hit the trigger, release the old target and take its place at the end of the cable. Below is shown the position of the trigger and catch at the moment of release.

With such an attachment it is possible to use many targets with one plane during a period of anti-aircraft firing. The targets one after another are sent down the cable and in each case the old target is released and dropped to the waiting markers on the ground. Targets are threaded on the cable on the ground and the pilot has only to release them.



How an anti-aircraft sleeve target is towed. The drawings above show how the used target is released by its successor.

U. S. Marine Ace Meets Death in National Air Races

Captain Arthur Page, U. S. Marine Corps, and his cut-down Curtiss Hawk in which he made an unofficial speed of 300 miles per hour.

CAPTAIN Arthur Page, the foremost flyer of the U. S. Marine Corps, was killed while competing in the National Air Races in Chicago. At the time of the accident he was leading the race with a speed of over 200 miles an hour.

Sea Plane Solves Atlantic Riddle

QUITE evidently, what aeronauts have been aiming at very strenuously for three years is a speedy and safe medium for crossing the Atlantic Ocean by air. The endeavors have not been unlike the ancient quest for a short route to the rich markets of the East Indies in their final analysis.

The *Bremen* and the *Southern Cross* made the westward crossing successfully. The *Graf Zeppelin* and the *R-100* tried to solve the gigantic puzzle by trying to prove that the airship was the answer to safe and speedy journeys by air.

Then, right out of a clear sky, literally speaking, the German sea-plane, *Dornier-Wal*, landed off the Battery, in New York bay, after completing a flight from List, a little flying village on the Isle of Sylt, in the North Sea, in forty-seven flying hours.

Captain Wolfgang von Gronau, who piloted the monoplane *Dornier-Wal* explained that his flight was for no other purpose than to give the sea-plane a redeeming place in the trans-Atlantic riddle.

The plane which was used in the experiment was made of duralumin with two large motors mounted tandem on the top of the wing. Each motor drove a four-bladed propeller.

Aviation Adopts Rodeo Stunt

THE noted German aviator, Ernst Udet, recently performed the difficult feat of picking up a cloth resting on the ground by means of a hook fastened to a long bamboo pole and projecting from the lower wing of his biplane; a feat which requires the utmost in daring and flying skill. Udet made seven pickups out of ten attempts.

Ernst Udet picking up a cloth from a speeding airplane. The cloth is raised one foot from the ground on pegs and is hooked with the pole.

HANDIKINKS

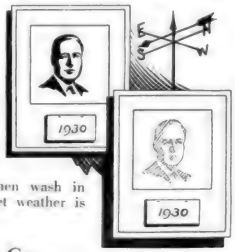
It is surprising how much time and effort can be saved by the use of simple and easily made devices such as described in this department.

Rubbers Keep Door Prop From Getting Lost

FOR keeping the door propped open there is no better means than the insertion of the time-tried triangular wedge of wood, which is jammed under the door by a kick of the toe. The chief difficulty with this scheme, however, is that the wedge has an annoying habit of never being around when it is wanted. The best solution of this problem lies in fastening the wedge to the door by means of a cord of rubber bands, as illustrated in the drawing at the left. In this way the wood can never get lost; when not in use it hangs suspended from the crosspiece, always in readiness to be shoved under the edge of the door.—Lester P. Young.

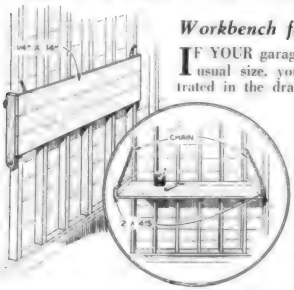
Calendar Picture That Predicts Weather

AT a very small expense you can make a calendar that will predict the weather for the next 24 hours as well as tell the date. First coat a sheet of heavy white paper with a ten per cent solution of ordinary gelatine, and then after dipping it for a few seconds in a ten per cent solution of potassium bichromate, hang it up in the dark to dry. Next, place a snap shot, with the treated paper, in a printing frame, and expose it to a diffused light until the images are seen in a brown color on the paper. Finally soak the exposed paper in a ten per cent solution of cobalt chloride for five minutes and then wash in clear water and dry. The picture will fade when wet weather is coming and turn blue for fair weather.—Ken Murray.



Workbench for Small Garage

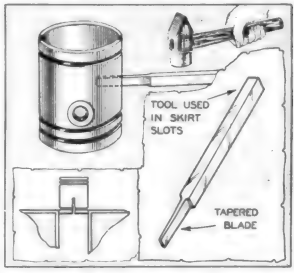
IF YOUR garage is too narrow for a stationary bench of the usual size, you can easily install the folding bench illustrated in the drawing at the left and thus have the facilities of a much larger garage. This bench is a simple plank affair, bolted at the back side to the studding. These bolts act as pivots, so that the bench, when not in use, can be raised and locked against the wall out of the way. When the bench is in this position, the thickness of the top is all that projects out into the room. You can build a shelf above the top of the car to hold the tools that you wish to keep in the garage, so that when you wish to work, you have only to unfold the bench, and take down your tools.—J. Blaine.

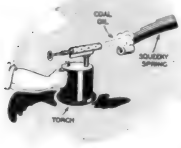


Ideas for the Motorist

Here's a Cure for Motor Rattle Caused by Worn or Loose Pistons

A DISTINCT rattle in your car is usually an indication that the pistons are worn or loose. If they are of the aluminum alloy split skirt type, this can be remedied with a tool shaped as illustrated in the drawing at the right. This tool, which has a tapered blade, is driven down into the slot with a hammer to a point where the piston expands to a size that will permit it to fit snugly into the cylinder bore. All burrs should be filed off, so that the surface of the piston is perfectly smooth.—G. A. Luess.



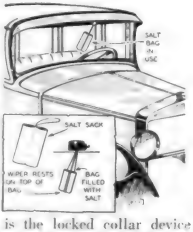


Stopping Squeaks in Springs

FOR removing rust, and at the same time removing the squeak from a spring, there is no better remedy than soaking the noisy spring with coal oil, as illustrated in the drawing at the left. This done, apply a blow torch to the metal and heat until the rust falls off or can be easily chipped off.—Herman Marson.

Salt Bag on Wiper Melts Ice on Windshield

SOMETIMES when ice and snow start coming down thick and heavy in zero weather, the windshield wiper will fall down on the job, due to clogging. A bag of salt attached to the wiper in the manner illustrated in the drawing at the right, however, will keep the glass absolutely clear at all times. The sack is made of a piece of muslin, size 3"x6", sewn into two compartments, with a hem and drawstring around the top, and stuffed with common table salt.—Robert Wilson.

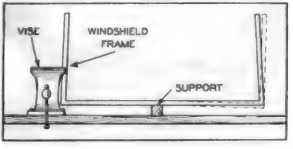


Lock Collar Prevents Tire Theft

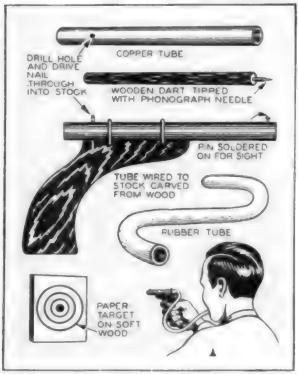
ONE of the best little devices for protecting your tires against theft is the locked collar device which is fitted over the air valve, as illustrated in the drawing at the left. Before a thief can remove the tire he must remove the collar, which is impossible unless he is a good lock picker. It is, however, the most effective device known.—Henry Mooney.

Inserting Windshield

THE correct method of holding a windshield frame when putting in a new windshield is shown in the drawing at the right. With one side of the frame clamped into a vise, and the center supported by a block, the other side is bent down, permitting the insertion of the glass.—A. C. Wilson.



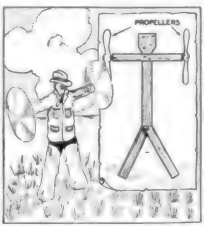
Stunts for the Handy Man



Toy Pistol Fired by Lung Power

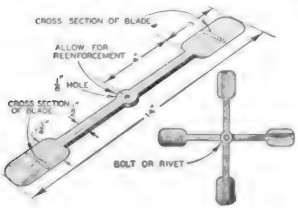
AN INGENIOUS little pistol which will teach you accuracy with a regular revolver and develop your lungs in the bargain can be made from a wooden dowel stick, a copper tube and a piece of rubber tubing. The gun fires darts which can easily be retrieved, the range depending upon the power of your lungs. A copper tube about ten inches long is first fastened to a piece of wood which has been carved into the shape of a handle as shown. A nail is driven through the rear of the tube to hold the dart in place and also to act as a sight. The bullet or dart consists of a dowel stick five inches long with a phonograph needle stuck in the end. Power is supplied by means of a rubber tube one end of which is placed over the copper tube, the other end being held in the mouth of the shooter. To fire, simply draw a bead on the bull's-eye and blow like the deuce.—J. Wembley.

Scarecrow With Whirring Props Shoos Birds



THE common variety of scarecrow makes very little effort to actually scare birds; it just stands there and lets nature take its course. A more energetic scarecrow—one which chases birds by stirring up a rumpus—can easily be made from some old 2x4s which are assembled as shown in the drawing at the right. The head of the scarecrow is made of a piece of board about eight inches square. At the end of each arm a propeller about a foot in length is screwed, not, however, until after the clothes have been put on. The noise made by these propellers whirring in the breeze will frighten the most fearless crow away. Several scarecrows in the garden will rid it of the pests altogether.—Patrick O'Leary.

This Simple Boomerang Can Be Made From Two Pieces of Pine Wood

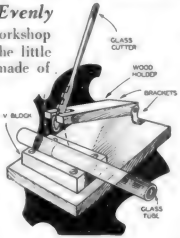


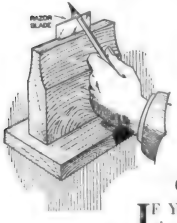
THROWING boomerangs is a great sport if you have a good boomerang. It takes considerable careful carving and balancing, however, to make a good one, such as illustrated in the drawing at the left. This boomerang is made of two pieces of pine or spruce 14 inches long and cut to the dimensions and shape shown. One-eighth inch holes are bored in the centers of the blades to take the bolts which fasten them together. To throw, hold the boomerang by one blade with the curved side up and toss into the wind.—Arthur Mann.

Kinks for the Workshop

Here's a Handy Jig for Cutting Glass Tubing Evenly

CUTTING glass tubing may seem an impossible stunt to workshop fans, but the trick is really very easy if you can rig up the little jig shown in the drawing at the right, which can be easily made of common materials. The piece of wood which serves to hold the glass cutter is slotted in one end, and the cutter is held firm in this by means of a wing bolt which compresses the slot arms. Two window blind brackets are screwed to the other end of the holder to act as pivots. The tubing to be cut is placed in the V-shaped holder and revolved slowly while the cutter is being held against it with sufficient pressure to cut the ring. When the groove has been made, a few slight taps on the tube will do the rest.—William Orsman.



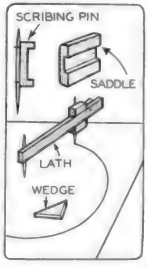


Pencil Sharpener from Razor Mounted in Block

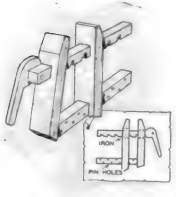
FOR the mechanical draftsman or artist there is no pencil sharpener less expensive, less likely to slice the fingers, or more efficient than the mounted razor blade, shown in the drawing at the left. A narrow slit the size of the blade is cut in the chamfered edge of a piece of wood, which is mounted on a baseboard and secured firmly with screws. The razor blade is then inserted in the slot and made firm by jamming tiny strips of paper in with a knife.—Don Jackson.

Compass for Sheet Metal Work

IF YOU are up against the problem of cutting out a large circular piece of sheet metal, you will usually find that for inscribing the circle the ordinary compass is inadequate, as it is too small and too inaccurate. The problem can be solved, however, by making yourself a beam compass like the one illustrated in the drawing at the right. A piece of lath is planed down smoothly, so that the grooved saddle shown in the drawing will fit snugly over it. A sharpened nail is driven through one end of the lath to serve as a center pin, while a scribing pin is fastened to the saddle, which is fitted over the other end and made secure by inserting a wedge in between the groove and the lath.—T. S. Asgaard.

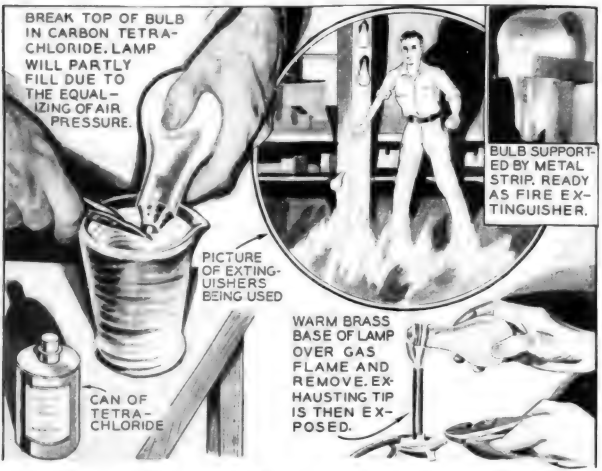


Vise Made Without Screws



FOR simplicity and cheapness there is nothing to beat the little vise shown in the drawing at the left. It will hold as firm as any other, and can be made in a short while by a clever craftsman. Hardwood is used in the construction. The jaws and lower tongue are of ash; the notched bar and cam lever of hickory. The dimensions may be any that you wish. The top tongue is notched for adjustment as shown, and held in place by a strip of iron. The bottom tongue is fastened by means of a hinge to the outer jaw and held firmly in place by a long bolt thrust through the pinholes in the rear. The movable jaw has a recess cut in it so that the cam lever will not twist sideways when pressure is applied.—A. C. Wilson.

A Workshop Fire Extinguisher



The above drawing shows how the bulb is filled with carbon tetrachloride after the base is removed. A number of these bulbs so filled and sealed can be hung up in convenient places by metal strips.

FOR a trifling cost you can equip your workshop, home or garage with fire protection in the form of effective extinguishers made from burnt-out electric lightbulbs filled with carbon tetrachloride. This chemical, obtainable at drug stores or chemical supply houses, is a colorless, volatile liquid that, when thrown on a fire, evaporates rapidly, reducing the heat and shutting oxygen from the flames.

If the bulbs you are going to use have tips your problem is simplified. If "tipless," you must first remove the bases by heating over a gas flame and twisting them loose with pliers. This exposes the tips left when the bulbs were sealed off after exhausting at the factory.

Pour some of the carbon tetrachloride into a wide-mouthed tumbler and insert the tip-end of the lamp into the liquid. Then, with pliers or a file, break the glass tip. There is usually a partial vacuum inside even a gas-filled bulb, so that a quantity of the liquid will be forced in by the outside air pressure, partially filling the lamp. Finish the filling operation by forcing the carbon tetrachloride through the small opening with a medicine dropper or a glass tube drawn to a fine tip and used in conjunction with a funnel. Do not fill the bulb entirely full, but leave a small space for expansion of the liquid when it becomes warmer.

The best way to keep the liquid inside the lamp is to seal the opening shut by heating the glass. If you are not skillful at doing this, you can seal the tip with plaster of Paris.

The extinguisher is supported in a convenient position by a holder made by nailing a metal strip to a wood block so that a loop is formed, into which the bulb is placed. To use the extinguisher, simply throw it at the base of a flame. The glass breaks, releasing the liquid.

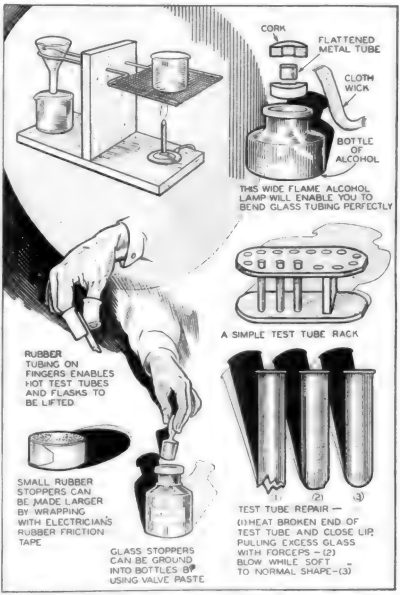
Helps for Amateur Chemists

Here are a few handy hints that will aid in your chem lab experiments and suggest ways of cutting expenses by repairing broken or defective apparatus.

CHEMICALS are, as a rule, inexpensive. The real upkeep of a small laboratory is in apparatus. Home-made apparatus sometimes does the work as well as professional instruments. The few kinks presented here have been found to give good service in the amateur's "lab."

A combined heating and filtering stand can be made by fixing a wooden upright member to a wooden base board, the latter measuring eight by four inches. Two pieces of iron rod are thrust through the upright piece and bent on each side as shown in the illustration. For holding a filtering funnel, the rods should be bent to a semicircle. The other ends of the rods should be fitted with galvanized wire screening to support beakers, and flasks for heating.

Short lengths of rubber tubing, slit if desired, and placed upon the thumb and index finger will enable hot test tubes and beakers to be lifted.



These drawings give a few hints for handling apparatus, repairing broken parts, and putting your laboratory in first rate order.

Small rubber stoppers which do not fit flask or bottle mouths can be made larger by winding electricians' rubber tape around them.

A broad thin flame should be used in bending glass tubing. Lacking gas, an alcohol lamp with a broad flame can be made quite easily. A metal tube is flattened to carry a wick. The metal tube is held in the alcohol bottle by means of a cork stopper, slotted to carry the flattened metal tube.

Glass stoppers can be ground into ordinary glass bottle by using valve grinding paste (carborundum or emery powder and water) and employing a rotary motion. Grind on the high spots which are located by means of a pencil mark upon the stopper and a twist or two without the powder.

Broken test tubes can be made into new ones by heating the broken ends in the flame and pulling out with forceps or pliers. Blowing into the open end will round the red hot closed portion out. Do not have the repaired end with too thick walls. Cover with soot in a yellow gas flame and allow to cool slowly.

The bottoms of two grape baskets will make a handy test tube support. One of them is bored to receive the tubes as shown in the drawing above.

Amazing Stunts with

Here are some amusing parlor tricks, which require no elaborate equipment, for entertaining your friends.

ABOUT the best trick ever performed with a rubber band is the one concerning the back of the school teacher's neck and a juicy wad of paper. But there are others . . .

For something absurdly simple—or is it?—try this one: Take a stout rubber band and snap it over your fingers and thumb at the first joint. The idea is: Can you, using this one hand only, work the rubber band down to your wrist? Try it! Dollars to doughnuts you'll get the most desperate, useless feeling when you get the rubber band about half-way down and find that despite all your finger waggling it will go no further than the middle of your palm.

And the "how" of it? It's really too simple. If you will double the band before putting it on your fingers, thereby making it a tight *round* band instead of a fairly loose *flat* band, you will find that the mere opening of the fingers will send the rubber loop scooting towards the desired position.

Listen to this one: The performer drops a dozen single rubber bands into a glass. He places a handkerchief over the glass. He removes the handkerchief. And—Abracadabra—the rubber bands have grown friendly in the twinkling of an eye and are brought from the glass linked together in one single strand!

To do the trick you must get a piece of gray cardboard and cut from it a piece which will exactly fit inside the glass, dividing it into two compartments, as shown in Fig. 4. Into one of these compartments you should place 12 rubber bands, linked together. When you perform the trick, these linked bands are to the rear. The audience cannot see them because the cardboard insert is to the front. The audience cannot see the gray cardboard insert because the glass is placed in front of a gray box, and the insert blends indetectably with the background, making the glass appear what it should be—a perfectly empty glass.

The rest is simple. You merely drop the single bands into the glass, taking care that they fall into the front compartment. Under cover of the handkerchief, you turn the partition around so that the linked bands are to the front and the unlinked bands to the rear. After removing the linked bands, you stuff the hanky into the glass and then remove the glass from the table. It's as simple as all that!

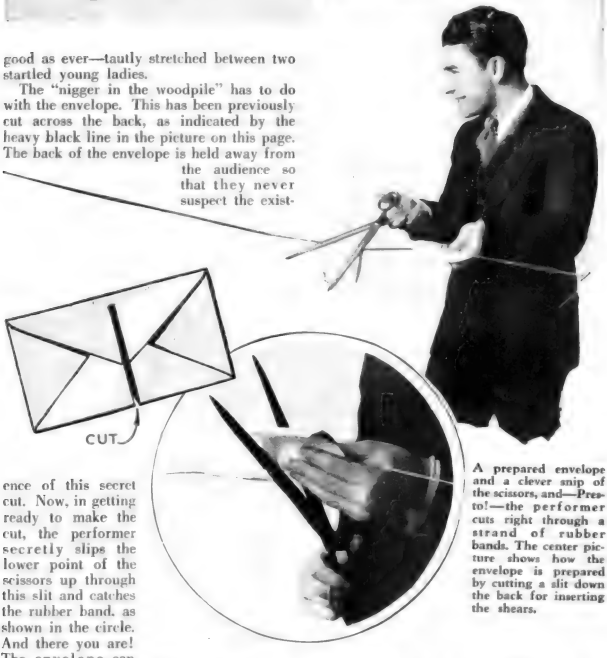
For a follow-up, try this: Take the 12 linked bands and thread them through an envelope, either end of which has been snipped off. Have two fair spectators hold opposite ends of the strand, and make them stand some distance apart in order to stretch the bands taut. And now, Watson, the scissors! There is a shrill exclamation from the holders of the tightly-stretched rubber chain. A quick flashing snip of the scissors. A scream. But—no—the envelope is apart in two pieces, while the rubber band is as

Rubber Bands

by SAM BROWN

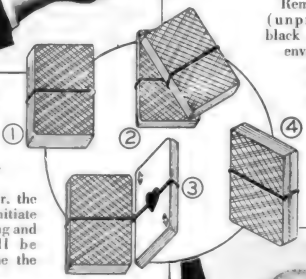
good as ever—tautly stretched between two startled young ladies.

The "nigger in the woodpile" has to do with the envelope. This has been previously cut across the back, as indicated by the heavy black line in the picture on this page. The back of the envelope is held away from the audience so that they never suspect the existence of this secret cut. Now, in getting ready to make the cut, the performer secretly slips the lower point of the scissors up through this slit and catches the rubber band, as shown in the circle. And there you are! The envelope can now be cut in two, screams regardless, for the rubber band is safely out of the way—on the back of the scissors.



A prepared envelope and a clever snip of the scissors, and—Presto!—the performer cuts right through a strand of rubber bands. The center picture shows how the envelope is prepared by cutting a slit down the back for inserting the shears.

Something else: The performer exhibits a deck of cards encircled with a rubber band. He shows the face card to be the ace of hearts. He tosses the deck into the air. And —*mirabile dictu*—when the pack is exhibited again, the face card has changed from red to black, the five of clubs now being to the front! It's all in the rubber band. In the first place, the band is snapped over the deck crosswise, as shown in Fig. 1, on the next page. Then, the performer gives about one-half of the deck a complete turn, as in Fig. 2, and then folds the top half to the under side of the pack, book fashion, as pictured in Fig. 3. The pack is squared up and the face card is shown to the spectators. That's all there is to it! If the deck



Changing a card from red to black—a twisted band does the trick. The drawings in the center show the various stages of preparing for the trick.

is tossed into the air, the rubber band will initiate some fancy unwinding and the top card will be changed by the time the deck has descended.

The next one sounds rather complicated: The performer exhibits two rubber bands, one red, the other black. He places the red band into an envelope; the black band into another envelope. He seals both envelopes. The magician then requests a pencil to mark the envelopes "black" or "red" according to which color rubber band each contains. In the meantime, however, the envelopes have become mixed so that it is necessary to open one in order to make certain the proper labeling of each. The rubber band—let's say the red one—is removed from the torn envelope and resealed in another envelope which is shown to be empty. This envelope is marked "Red;" the other, of course, is the "Black" one. The whole stunt is simply this: The rubber bands change places—the black band is found in the "Red" envelope, and the red band is found in the "Black" envelope.

How is it done? More tricky envelopes. In this case you must cut from two envelopes the front portion including the gummed flap. This "half envelope" is then slipped into another envelope and a red rubber band is placed between the two flaps. The gummed edges are stuck together, making the envelope appear to be quite ordinary and empty. A second envelope is prepared, this one housing a black rubber band.

Start the trick by exhibiting a black rubber band and a red rubber band, also a pack of envelopes, the top three of which are, in order: An unprepared envelope, the prepared black rubber band envelope, the prepared red rubber band envelope. Remove the first envelope (unprepared) and place the black band inside it. Seal the envelope. Take the second envelope (already containing a black band) and place the red band inside it. Seal this envelope. Keep your eye on it. Pretend to become confused in asking for a pencil, and tear this envelope open to verify the colors. By opening the envelope by tearing the end, you gain access to the secret compartment. You reach in and take out the concealed black band, immediately

The edges of the cards must be held in place.

crumpling up the envelope and tossing it aside. You now pick up the third envelope (containing the concealed red band) and show it to be empty. You seal the black band inside this envelope and label the envelope "Black." The other envelope (really containing the black band) you label "Red."

And that's the trick finished. You give the "Red" envelope to a spectator; you retain the "Black" envelope. In opening your envelope, you do so by tearing the end, and removing the concealed red rubber band. The spectator may open his envelope in any manner he desires. Try it! It's really not at all as complicated as it sounds.

Here's a "chestnut"—old as your Aunt Maggie — but good entertainment regardless. The performer exhibits his good left fist. A rubber band is seen encircling the first and second fingers. The performer opens his hand. Yep, it's the famous acrobatic rubber band. It is now on the third and fourth fingers, having made its famous leap for life and glory.

It's absurdly simple. Like this: Place the band -a fairly tight one, over your first and second fingers. Now, pull the band away from the inside of the hand, as in the drawing on the left, and insert the tips of the four fingers into the loop, as in the left of the circle. Turn your fist back up and exhibit the band to a spectator, as at the top of the page. When you open your fingers, the band at once jumps from first and second to third and four—four speeds forward, as it were—and the spectators are greatly puzzled. Maybe!

Above—This is what the spectators see before the trick is performed. At the left is shown how the band is drawn back and the tips of the fingers inserted.

And this is the position of the band after its mysterious leap from the position shown in the top picture. After the finger tips are inserted it is only necessary to open the hand.

About the best stunt ever performed with a rubber band is the one concerning the back of the school teacher's neck and a juicy wad of paper. You take a wide band and place it over the outstretched first and second fingers of your left hand. Then you place the spitball . . . But say, you probably know that one better than I do!

Churn, Meat Grinder on Washer Lightens Wife's Work

The churn or cream whipper attachment, which is fitted on in place of the gyrator of the washer, is shown above.

The wringer can be removed and replaced by the meat grinder unit, which is set over the shaft head of the power leg, as shown in this photo.

A WASHING machine manufacturer has found two new ways of lightening the work of the housewife, especially on the farm. With the attachments shown in the photos at the left, she may now grind her mince meat, sausage or vegetables with power from the washing machine, and at the same time churn up the week's cream for her butter supply.

It takes but a minute to convert the washing machine into a meat grinder. The wringer is removed and replaced by the grinder unit, which is set over the shaft head of the power leg of the washer. When chopping ordinary foodstuffs, this grinder has a capacity of two pounds per minute. There is a safety feed device which exerts constant pressure on the food to facilitate chopping, and at the same time act as a safeguard for the operator.

In converting the machine into a churn, the gyrator is removed from the tub of the washer, and the churn container and paddle is slipped on in its place. This churn is made of aluminum, which is said to be an ideal material for the purpose. It is easy to keep clean, will not absorb odors, resists rust, and is very durable. The churn has a capacity of five gallons, but will churn small quantities equally well.

The churn does not oscillate. The dasher, which is shown in the photo at the top of the page, consists of double aluminum blades which are fastened to a hub. A snug fitting lid fits over the churn.

Small Flying Boat Crosses Ocean

THE surprise flight of the small German flying boat captained by Wolfgang Von Gronau, who was accompanied by three companions, ended successfully at New York. In making the flight from Europe to North America, the boat made four stops—Orkney Islands, Greenland, Iceland and Halifax.

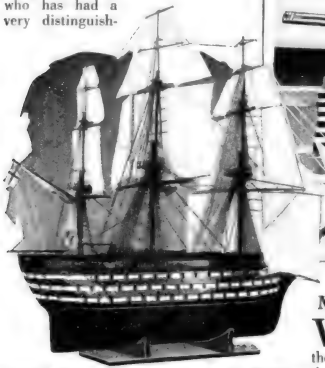
New Headlight Lens Reduces Glare

AN ADDITIONAL safeguard for motorists is seen by automobile and traffic engineers in the new type of headlight which was recently displayed at a Detroit auto show. The new light, which is shown in photo at the right, has its lens so ground and arranged that there is adequate projection of diffused light without glare.

This new headlight reduces the blinding glare to a minimum, and has a small parking light.

Building Models Is Hobby of Retired British Admiral

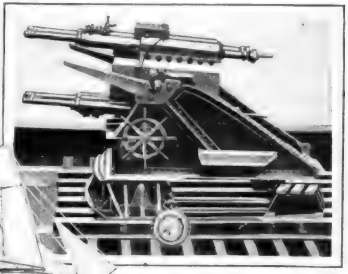
PROMPTED by a desire to show amateur ship modellers how a ship should be rigged in real sailor fashion, Admiral Sir Reginald Bacon, K. C. B., D. S. O., who has had a very distinguished service record in the navy, built a small scale model of the "Prince Albert," the last of the sailing battleships of the British navy. The model, shown in the photo above, which is correct in every detail, was the result of years of patient toil, and of careful study of various official records of this particular vessel.



Admiral Bacon built this model of the "Prince Albert," last of the British sailing battleships, to show correct rigging of old men-o-war.

The sails are all especially cut and sewn in exactly in the way that the old time sails were made. There are over 600 pulley blocks in the model, each containing a running sheave, all especially made. Altogether there are more than 10,000 separate parts in the completed model. Lady Bacon assisted in the work of fashioning the various items.

Sir Reginald is also the designer of a 15-inch howitzer which after being adopted by the admiralty, rendered invaluable service in France. When the war was over, he decided to make a working model of the design of the gun, and the result was the model shown in the photo.



During the war, Admiral Bacon, of the British Navy, designed a 15-inch howitzer which rendered invaluable service in France. After the war he built the working model of it above.

Model Shows Moon in Miniature

VISITORS to the Chicago Field Museum may get a pretty good idea as to what the moon looks like at close range from the mammoth model shown below, which was constructed by German astronomers.

This mammoth model of the moon, constructed by German astronomers, was presented to the Chicago Field Museum by Mr. Lewis Reese.

Clams Nurtured by Secret Process Yield Perfect Pearls

The clams which are being nurtured in the river bed are examined frequently with a periscope.

AFTER 30 years of scientific experimental work, Bernard Lubben, who is shown at his work in the photo at the left, has developed a secret process whereby he produces perfect pearls through artificial culture. His laboratory is a spot in the bed of the Mississippi river just in back of his house. Here he nurtures his clams, examining them at intervals with the specially designed periscope, until they become perfect pearls.

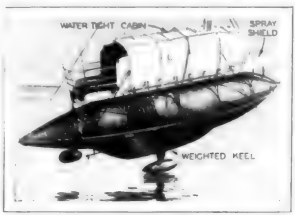
Lubben accomplishes the creation of his perfect pearl by a process of clam surgery, using an instrument of his own design, whereby he creates a deposit, or pocket, of nacre in the nucleus of the clam. Hundreds of these clams are buried in the screen boxes in the bed of the river which protect them from fish. After eight or ten years of cultivation, which is also another of Lubben's secret processes, the pearls are brought up and the perfect jewel extracted.

Shaving Mirror Illuminates Face

A SHAVING mirror which throws a clear, even light over the face of the shaver, brings out in detail, with its concave surface, all the minute details of the features, thus ensuring a perfect job, and keeps clear of any accumulation of moisture, has recently been put on the market by an English manufacturer. What marks its departure from the general run of shaving mirrors is the lamp placed in the rear as shown in the drawing below. Through a small hole in the bottom of the mirror, this light throws a strong direct light on the features, which are magnified by the concave surface. It is the heat from the lamp that keeps the moisture from collecting on the glass.

The light thrown on the face through the hole, lights up the features for a good shave.

Freak Boat Can't Sink or Tip Over



This freak boat is made non-tippable by a weighted keel, and non-sinkable by six watertight compartments in the metal hull.

THE latest in freak boats is the non-sinkable and non-tippable craft shown in the photo above, in which a German inventor will attempt to cross the Atlantic this winter, to prove that his boat can stand up in the roughest weather.

Its hull is divided into six watertight compartments and has mounted on it an equally water tight cabin, which is protected from spray by a shield around the base.

SPARKS FROM THE RADIO EDITOR

Edited by

L. B. ROBBINS

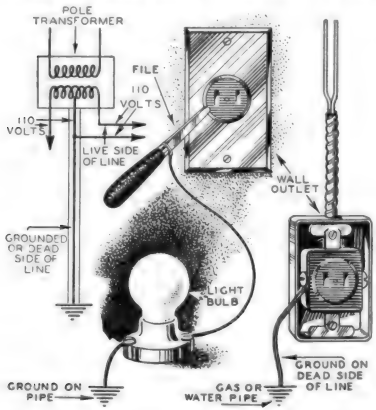
During these winter months, when the cold keeps us indoors, there is no better way of whiling away the time than by experimenting with radio. Mr. Robbins, widely known radio authority, presents in Modern Mechanics this month some new ideas for bringing your set up to top-notch efficiency.

Here's How to Reduce AC Line Noises in Your Receiver

OWNERS of AC operated receivers are often puzzled as to just how to cure line noises arising from the AC current in the house or outside wiring. It has been found that such noises are often due to poor or inefficient grounding of the dead side of the line.

In the average pole transformer delivering 220 volts—110 volts on each side of the line—the center tap is grounded, as illustrated in the drawing at the left. However, due to the long run of wires, the grounded side of the line is not always at ground potential at the wall outlet in the house. The wires thus act as a sort of an antenna, and pick up undesirable line noises which react upon the receiver. By grounding the dead side of the line at the receptacle, much of the noise can be eliminated.

To find which wire is dead, rig up the tester, composed of the light bulb, file or knife, and ground, as shown in the drawing. Then insert the blade in one slot of the receptacle. If the lamp lights up you have touched the live side; if not, you have struck the grounded side. Finally, hook one end of an insulated wire to this grounded side and attach the other end to a water pipe.



Line noises can be eliminated by locating the grounded or dead side of the line with the tester shown above, and grounding the dead terminal of the wall receptacle on a water pipe near by.

The Robbins Long Distance

by
L. B. ROBBINS

Fig. 1. The panel is laid out as shown above. 3/16-inch wood makes a good panel, but hard rubber or bakelite is best. The ammeter hole is cut as shown in Fig. 7.

PART I

RADIO enthusiasts who are just little more than beginners and who want to have a voice of their own on the air, so to speak, are quite often at a loss to know how to go about erecting a transmitting station that is at once efficient, inexpensive, and easily built.

This article is intended for MODERN MECHANICS AND INVENTIONS readers who are in just this situation. Technical and theoretical knowledge are entirely unnecessary for construction. The apparatus is all extremely simple and inexpensive—practically all the parts required can be cast-off and ancient material gathered from the workroom junk box, or from obsolete receivers.

This should be a big incentive to readers with a slim pocketbook when they are assured that by carefully following the plans herein they will possess a station that will actually work and work well with a minimum outlay. Just such a station, built by the writer, has been in successful communication with other amateurs throughout the country for over three years. The outfit will cover all legal requirements and give the user hours of pleasure and experience by which he may graduate later into broader amateur fields.

In building the transmitter, which is designed to work on the 40 and 80 meter amateur wave band, the following materials will be needed. Use only good parts, for it will pay you in the long run.

2 .0005 mfd. variable condensers with dials.
4 .002 mfd. fixed condensers.
1 .001 mfd. fixed condenser.
1 UX or UV socket.
1 UX 201A tube.
1 6 ohm rheostat with knob.
1 5,000 to 10,000 ohm grid leak with mounting.
2 100,000 ohm resistors or Xmas tree lamps

Low-Power TRANSMITTER

Radio amateurs who are desirous of getting on the air with a transmitter of their own will find this simple, yet highly efficient, set just the thing for talking with fellow amateurs over great distances. It is designed especially for beginners without much technical knowledge of radio. Mr. Robbins, nationally known radio expert, has used this set to talk with stations all over the country.

1 Single pole—double throw miniature switch.
3 Binding posts on bakelite strip.
1 0 to 100 milliammeter.
Hard rubber, bakelite or dry wood panel.
Baseboard of soft wood.
Small pieces of ½-inch pine.
Some stiff flat brass about ½ inch wide.
2 strips of window glass ¾ inch wide.
1 6-inch piece of wood curtain roller.
About 25 ft. No. 10 or No. 12 soft copper wire.
Flexible hookup wire or bare wire and spaghetti.
Fahnestock clips.
No. 28 DCC magnet wire.
Assorted radio nuts and screws and bolts.
Insulated braided wire and battery clip.

First lay out the panel as shown in Fig. 1. All measurements are to be made to the center of holes. The meter hole can be cut out as illustrated in Fig. 7. The edge can later be smoothed up with a half round file or knife blade. The milliammeter can be dispensed with, however, if the builder cannot afford it. In this case the "B" plate voltage is run directly to the radio frequency choke coil.

When the panel is ready mount the two .0005 mfd. variable condensers in the two side ⅜-inch holes and put the rheostat in the center ⅜-inch hole. The little switch over the meter can be constructed as shown in Fig. 7. Mount the meter in the way provided with the particular make you may buy.

When everything is assembled on the panel, fasten its bottom edge to one 12-inch edge of the baseboard with three screws. It will help some to stiffen the panel's position if two small angle irons are fastened to each inside edge of the panel and to the baseboard.

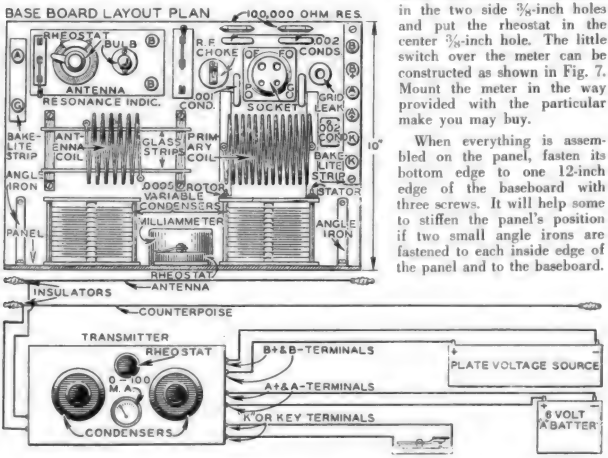


Fig. 2. The various parts are placed on the baseboard in the positions shown above. External connections are made from the binding posts on the bakelite strips. Tuning is done with the two variable condensers, the point of maximum current being shown by the bulb on the resonance indicator.

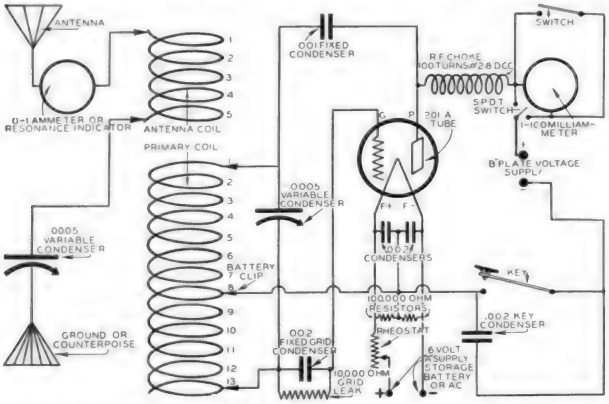


Fig. 3. The transmitter is wired up with the simple Hartley circuit above. The battery clip on the antenna coil is moved for tuning. The condenser across the key serves to eliminate sparking. If no milliammeter is used, the positive of the plate voltage is connected to the R. F. choke.

Figs. 2 and 5 show just how these angle irons should be placed and also present a clear picture of just how all parts are arranged on baseboard and panel.

At the right is a bakelite or hard rubber binding post strip on which are mounted six terminals; namely, B—, B+, A—, A+, and the two key terminals, K and K. Raise the strip about 1 inch from the base with a shim under each end. Then at the left place a second shorter strip in the same manner, but with two binding posts marked A and G, for antenna and ground connections.

At the left of the large binding post strip mount the two 100,000 ohm resistors close to the back edge. Christmas tree lamps may be used if resistors are not available. In front of them place the two .002 mfd. fixed condensers, and in front of them place the tube socket with its filament terminals facing the rear. Little angles of stiff brass bolted or soldered directly to one condenser terminal can be screwed directly under the socket binding post or baseboard as a means of holding the condensers erect, as shown in Fig. 5, and in detail on Fig. 7. By the same means fasten a .001 mfd. fixed condenser to the socket plate terminal and a .002 fixed condenser to the grid terminal. Shunt the grid leak across the grid condenser, either by soldering or by inserting it in the mount springs provided on the condenser. In any event use as short leads as possible. This is extremely important.

The radio frequency choke mounts vertically at the left of the socket. It is made by winding tightly the piece of wood shade roller with 100 turns of the No. 28 DCC magnet wire, as illustrated in Fig. 9. Place the coil in the mountings shown parallel and near the socket as indicated, so the choke will stand vertically and make good electrical contact.

The primary and antenna coils of the transmitter can next be made and mounted. Use No. 10 or 12 bare copper wire if you can get it. If you can obtain only insulated wire, you will have to burn off the insulation. Coil it up and place on a hot fire. In a short time the insulation will be practically consumed. Remove from the fire and scrape off the remaining covering and then sandpaper the wire bright and clean.

Straighten it out as much as possible and then proceed with the coil winding as illustrated in Fig. 8.

The wire should first be wound on any stiff cylinder, such as a piece of water pipe, about 2½ inches in diameter. Catch one end of the wire in some convenient manner and wind on the turns slowly and evenly, keeping them close and tight. Wind on 13 full turns leaving

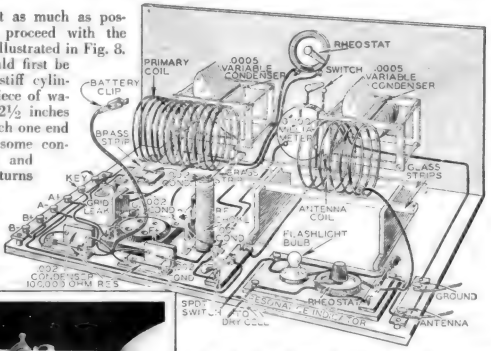


Fig. 5. This isometric view of the transmitter shows clearly how the parts are placed and wired up. The leads from the antenna coil should be flexible for coupling adjustment.

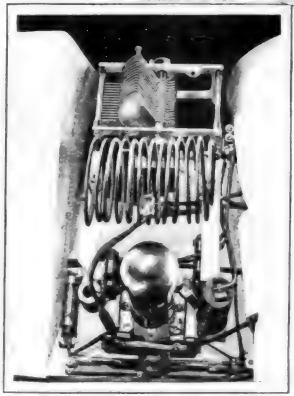


Fig. 4. This photo gives a view of the arrangement of the apparatus in the primary circuit. Note the position of the coil on the brass strips.

plenty of wire at each end. When the coil is removed from the form it will spring out to about 3 inches in diameter. Open the turns carefully so they stand about ⅜ of an inch apart and then straighten out each turn as nicely as possible so no kinks or bends show.

When you have a nice even coil bend the end wires down so they are level and parallel, and then solder an oval shaped brass lug to each end. The coil photograph in Fig. 8 will show how the coils should be arranged. Form the five turn antenna coil in exactly the same manner except there are no lugs soldered to the ends. Instead, use a short piece of flexible, braided wire soldered to each end of the coil.

The mounting for the 13 turn, or primary coil consists of two ½-inch strips of very stiff brass fastened to the stator and rotor terminals of the .0005 mfd. variable condenser as shown in Figs. 2, 4 and 5. These strips should run back towards the rear of the base, about 2 inches above it, and parallel, and fasten to the top terminals of the grid and plate condensers—the .002 and .001 fixed condensers respectively. Make connections tight mechanically and electrically at each end.

Drill a hole in each brass strip, into which solder an upward projecting brass bolt about ¾ inch long, as illustrated in Fig. 8. These are for the holes in the primary coil lugs. Bend the ends of the coil so the lugs will drop down easily over the bolts and so the coil itself will remain above the strips and be parallel with the panel. The coil can then be held firmly in position by screwing wing nuts or binding post nuts down over the lugs and turning them up

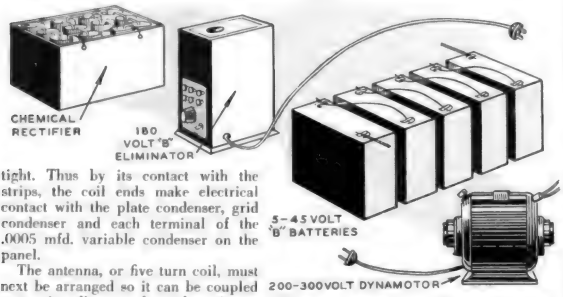
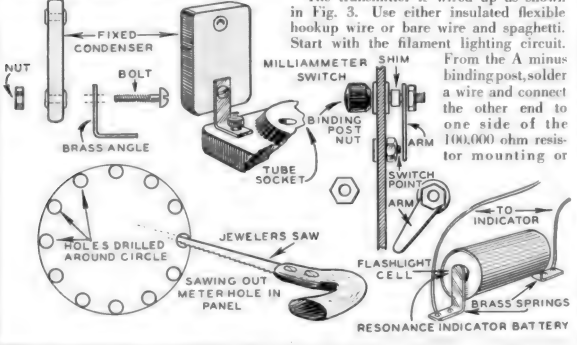


Fig. 6. Various devices for supplying plate voltage are shown here. It is essential that only pure direct current be used on the plate.

tight. Thus by its contact with the strips, the coil ends make electrical contact with the plate condenser, grid condenser and each terminal of the .0005 mfd. variable condenser on the panel.

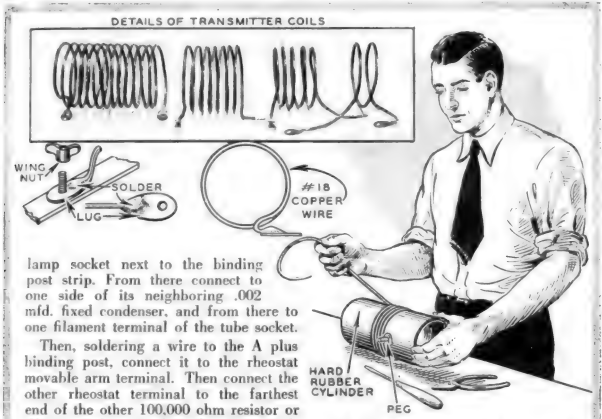
The antenna, or five turn coil, must next be arranged so it can be coupled at varying distances from the primary coil. A simple method of doing this is to slide it along a glass strip runway as shown in Figs. 2 and 5. Cut out two supports of thin wood as detailed in Fig. 9. Screw them to the base by the bottom lugs so that they stand vertical and parallel four or five inches apart in line with the primary coil. Saw a pair of vertical slots in the top of each support about 1½ inches apart and ½ inch deep. Then push the two strips of window glass into these slots so that a pair of glass rails are formed parallel with the panel. Place the antenna coil on these and slide it along anywhere desired. This completes the arrangement of parts for the oscillator and it is now ready to be wired.

VARIOUS DETAILS OF ASSEMBLY



The transmitter is wired up as shown in Fig. 3. Use either insulated flexible hookup wire or bare wire and spaghetti. Start with the filament lighting circuit. From the A minus binding post, solder a wire and connect the other end to one side of the 100,000 ohm resistor mounting or

Fig. 7. The drawings above show various details of assembly. All connections should be tight.



lamp socket next to the binding post strip. From there connect to one side of its neighboring .002 mfd. fixed condenser, and from there to one filament terminal of the tube socket.

Then, soldering a wire to the A plus binding post, connect it to the rheostat movable arm terminal. Then connect the other rheostat terminal to the farthest end of the other 100,000 ohm resistor or Christmas lamp socket, then to outside connection of its neighboring 002 mfd. fixed condenser and to the remaining filament terminal on the tube socket.

Next, connect the two remaining resistor or lamp socket terminals and fixed condensers together at one common point.

Fig. 8. The transmitter coils are wound as shown here. For 40 and 80 meter work, only 13 turn coil is used in the primary. Copper lugs are soldered on the ends, which rest on the brass strips to make contact with condensers.

From this common point a tap is run to the primary coil.

This filament tap for clipping on to the primary coil consists of a short piece

(Cont'd on page 206)

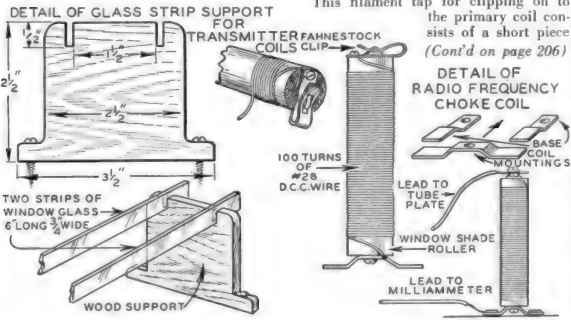


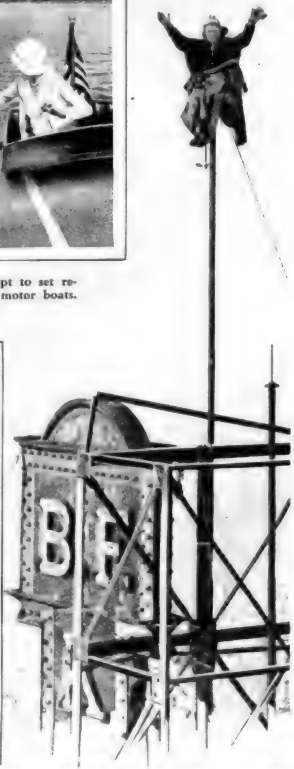
Fig. 9. Details of the antenna coil support and radio frequency choke coil are shown above.

Crazy Endurance Contests Are

The HEIGHT of

Louis Verog and Jack Hendricks attempt to set refueling endurance record for outboard motor boats.

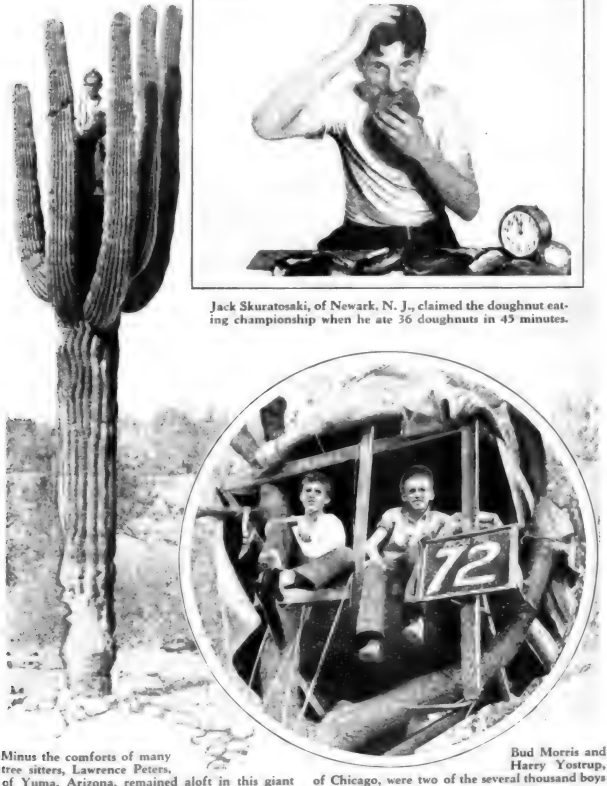
These three boys teamed up in an attempt to keep the bicycle moving all summer. The credit here should go to the bike instead of the boys.



Shipwreck Kelly, world's champion flagpole sitter, has sat on about every pole except the North and South, and he may tackle these sometime.

SOMETHING or OTHER!

Jack Skuratosaki, of Newark, N. J., claimed the doughnut eating championship when he ate 36 doughnuts in 45 minutes.



Minus the comforts of many tree sitters, Lawrence Peters, of Yuma, Arizona, remained aloft in this giant cactus for 118 hours. A desert electrical storm finally forced him to come down.

Bud Morris and Harry Yostrup, of Chicago, were two of the several thousand boys who escaped the squirrels during the summer. After all it's still a gay, foolish old world!

This Silencer for Pneumatic Road Drills Eases the Nerves

Photo of pneumatic drill equipped with silencer.

DIGGING up the pavement to install and repair gas and water pipes may soon cease to be the nerve shattering operation that it has been since the adoption of the pneumatic drill, if the type of drill pictured here obtains universal use.

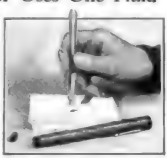
This pneumatic drill, which has recently attracted considerable attention in England, is equipped with a silencer which is said to eliminate sixty per cent of the usual noise. It is especially adapted for use on pavements and road beds. City dwellers who have been kept awake by night work of this type will eternally bless the inventor of this drill. Now if he will only design another silencer for use on pneumatic riveters, nerve specialists may soon be forced to go out of business. The silencer adds but little to the drill's weight.

Toy Drum Played Without Sticks

ALL play and no work is the feature of the stickless drum which is operated by pulling a cord. The string operates a spring attachment similar to that of a curtain roller. A series of small metal balls is so arranged as to produce drum beats as the string is pulled.

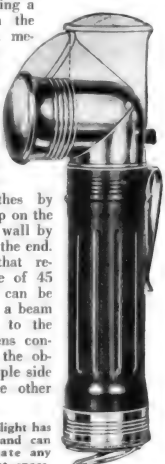
Ink Eradicator Uses One Fluid

THIS ink eradicator, which uses a single fluid conveniently and speedily removes ink spots from wearing apparel by shaking a drop or two of the liquid upon the spot.



Flashlight Serves All Purposes

A FLASHLIGHT adaptable to any kind of work where illumination is needed, in fact, one which can almost throw a light around a corner, has recently been placed on the market, filling a long-felt want on the part of campers, mechanics, plumbers, inspectors, and other men who frequently have need to work in dark and inconvenient places. The light, pictured at the right, can be fastened to the clothes by means of a belt clip on the side or hung on a wall by means of a ring in the end. Having a head that revolves at an angle of 45 degrees, the light can be adjusted to project a beam straight ahead or to the side. A special lens concentrates light on the object, but allows ample side illumination to see other things.



This all-purpose flashlight has an adjustable head and can be used to illuminate any small or inconvenient space.

Planer Peels Bark From Logs Faster Than Ten Men

A NEW planer which does the work of ten men has recently been invented by a San Francisco man and is now being used by Western lumber concerns for peeling the bark from telegraph poles. This work was previously performed with draw knives and took considerable time.

The new machine, which is operated on compressed air, can strip the bark from a log as fast as two men can push it. The three knives which do the work are mounted on pivots and automatically shape themselves about the pole.

Three revolving planing knives mounted on pivots automatically shape themselves around the log.

Nut and Washer Lock Rail Joints

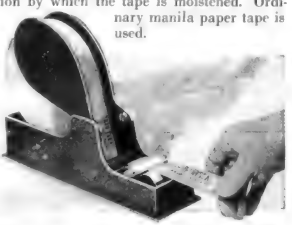
A BIG cut in the cost of railway maintenance is promised by Charles Sellers, of Pendleton, Oregon, who has obtained a patent on a lock nut for railway joints that will hold the bolt and nut in place for the life of the rail, making frequent inspections unnecessary. The joint is connected with the usual fish plates and bolts, but the locking device is incorporated into the washer and nut which cannot be loosened by vibration or wear but may be easily removed whenever desired.

Coffee Pot Need Not Be Watched

THE coffee pot pictured here need not be watched, as the bird on top whistles shrilly when the beverage is ready. Only the coffee must be measured, as the correct amount of water is obtained by holding it under the faucet until it overflows. It is built on the thermos principle and will keep coffee hot for over an hour.

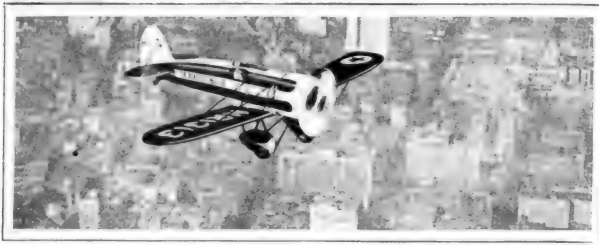
Prints and Moistens Gummed Tape

THE name and address of the merchant and other advertising matter is printed on gummed tape with this machine by means of rubber type with the same operation by which the tape is moistened. Ordinary manila paper tape is used.



Rubber type on top roller prints advertising.

How I Beat LINDBERGH'S



Whirlwind powered red and white Travelair monoplane speeding over St. Louis in its record flight.

I SUPPOSE that deep in the heart of every aviator there burns an ambition to vie, if not surpass, with the marvelous exploits in the air of Colonel Charles A. Lindbergh. In my case, being somewhat prejudiced against trans-Atlantic flying in a land plane, I set out to garner whatever honors might fall to one achieving a coast-to-coast record.

You may recall that last Easter my west-to-east time was lowered by Lindy, flying with his wife. It is from that moment that my story of how I broke Lindbergh's record dates.

As head of the aviation department of the Texas Oil Company, I set about in quest of a plane which would be speedier than Lindbergh's and yet could sustain the distance and its hazards, atmospheric and mechanical. My answer was a Whirlwind-powered Travelair, a red and white monoplane.

It was in this plane that I traveled from the Glendale Airport, Los Angeles, to the Curtiss Airport, Valley Stream, L. I., in 12 hours, 25 minutes and 30 seconds, clipping 2 hours and 20 minutes from Lindy's record.

My plane encountered no difficulties whatsoever. At no time during the flight, which was the fastest crossing ever made of the United States, did I have my engine wide open. I never dropped lower than 200 miles an hour and for a great part of the way I kept close to 260 miles. My average speed was about 230 miles an hour.

Those of you who can remember back to 1912 when Bob Fowler flew from San Francisco to Jacksonville, Fla., in 151 days may best appreciate the details of my flight of last August 13, which I am going to relate to you now. Incidentally, please notice how "13" is my lucky number.

The moonlight was playing over the Glendale Airport as I took off. My path through the Cajon Pass and behind the San Bernardinos in my race across the Mojave Desert was also guided by the moon's beams. I was hitting three miles a minute and climbing all the time.

Here I wish you would note that I did not mount to the altitudes of 10,000 to 13,000 feet but hovered in the lanes which were 3,000 or 4,000 feet up. Strangely enough, it was in this area that my "Texaco 13" made her true speed.

Ahead of me, over the Needles, I could see shimmering light penetrating through the sky. Above the Arizona plateau, near Flagstaff, I met the sun. I shot straight past Mount Taylor, over the Navajo Reservation and a few minutes later I cut my gun and glided down to the Albuquerque, New Mexico, landing-field. Mechanics were in readiness. They hastily refueled and examined my plane.

I had done 700 miles in 3 hours and 26 minutes on my first lap. During the 15-minute stop at Albuquerque, I munched one of the sandwiches which my mother had packed away for me. On leaving Albuquerque, I went in for real speed. However, I couldn't help treating myself to a second of mother's sandwiches.

I fell in with a 34-mile tail wind and I decided right then and there that, aside from

Cross-Country Record

By CAPT. FRANK M. HAWKS as told to ALFRED ALBELLI

The route followed by Captain Hawks in his record-breaking flight from coast to coast. The thin dotted lines show how far a train, a horse and a man could travel in the 12 hours and 25 minutes it took Hawks to go from Los Angeles to New York. A train would reach Kingman, Arizona.

an unforeseen accident, the bacon was going to be delivered home. In 2 hours and 20 minutes I scaled over the tip of Texas, over the mountains and wheat fields of Oklahoma, down into Kansas and finally Wichita, covering that stretch in the fastest time it had ever been made.

(Continued on page 192)

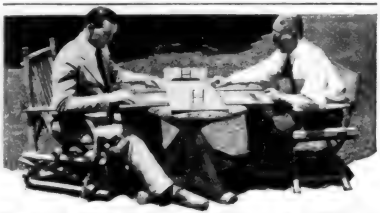
Now We Have Outdoor Chess as Well as Indoor Football

This mammoth chess board has squares of grass and marble. The figures are carved in wood, the king being 27 inches high.

STRANGE things have come to pass in the world, but strangest of all is the reversal of conditions under which the two ancient and honorable games of chess and football are played. For chess is now played on a large out-of-doors board and football is played in the parlor on a field held on a small table between two contestants.

A Mississippian hit upon the idea of playing an out of doors chess game and proceeded forthwith to build himself the chessboard shown in the photo above. The dark squares are formed by the grass of the lawn, while the white ones are of random rubble marble set in cement. The figures are carved from wood, some in ivory color and others in black, and beautifully polished.

To Howard H. Jones, famous coach of the University of Southern California, goes the honor of devising a way of playing football indoors. The game is played on a large board which is a football gridiron in miniature, upon which all the various plays can be executed. The player on the offense first selects the play he will make, then spins a needle which indicates where to look on the side panel for the outcome of the play, of which there are 752 possible ones. This arrangement of possible outcomes of the plays is one of the features which makes the game so realistic, especially to those who are thoroughly familiar with outdoor football.



Howard H. Jones, head coach at University of California, playing indoor football, which he invented, with Tom Lieb.

Here's How a Zeppelin Hangar Would Look Sitting Astride Niagara

This photo gives an artist's conception of how the gigantic Goodyear-Zeppelin hangar might look astride Niagara Falls.

ALTHOUGH it may seem so in the photo at left, the giant Goodyear-Zeppelin airship hangar built at Akron, Ohio, has not been moved to Niagara Falls. It is merely an artist's version of how the hangar would look if it were transplanted from Akron to Niagara Falls and there used as a mammoth bridge. The hangar, incidentally, is of a size that would just fit the falls. Despite this handy coincidence, however, the hangar will remain where it is.

HOME WORKBENCH

Edited by
A. NEELY HALL

If you have a few sharp tools and a handy workbench available, you can utilize your spare time in constructing things which are useful, fascinating, and instructive. Mr. Hall, editor of this department, is nationally known as a handicraft expert.

Make a Life Mask of Your Friend From Plaster of Paris

YOU can have no better mementoes of your friends than life masks of them. Once you learn the knack of this interesting stunt you can make such masks without causing them any discomfort whatever.

The first step is to prepare the subject for the moulding process. Cover his hair with a cloth bandage so as to keep it out of the plaster, then smear the face with a thick coat of vaseline, working it well into the eyelashes and brows. To provide for breathing during the operation, slip a tube of waxed paper up the nostrils.

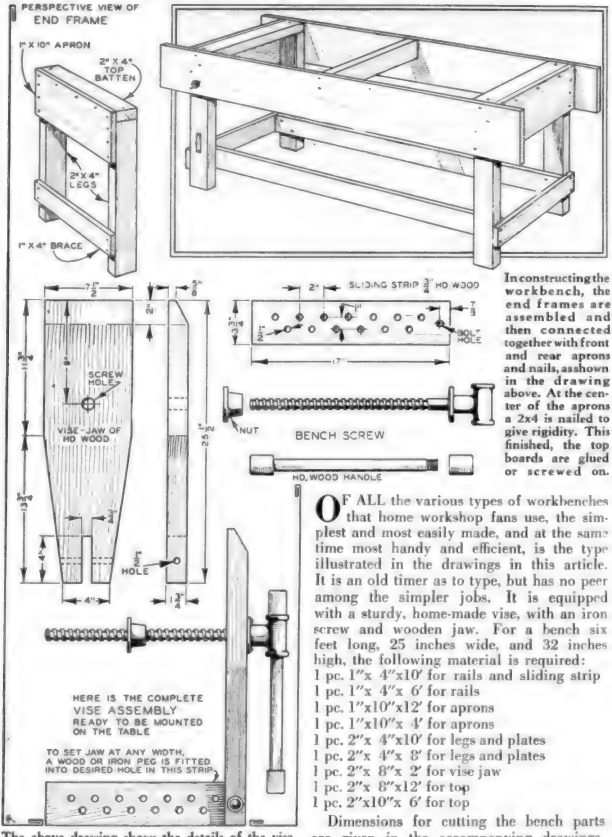
A mould of the subject's face, such as shown above, is first made from a mixture of plaster of paris. When the mould is removed, a plaster of paris mixture is poured in it and allowed to harden to make the cast, shown at the left.

In making the mould, mix enough plaster of paris with water to make a batch sufficient to cover the subject's face to an average thickness of ¾ inch. This mixture should be applied to the patient while he is lying on his back on a cot. The plaster should be allowed to set for about twenty minutes, or till it can be lifted off without breaking.

Allow the mould to become thoroughly dry before making the cast. Then cover the inside of it with a thick layer of vaseline, rubbing it well into every line and hollow. Next mix enough plaster of paris to fill the mould, making it somewhat thinner than the first mixture. Pour the plaster into the mould slowly, so that air pockets will not form. To provide the cast with a hanger press a hanger loop into the top, so that a wire can be wrapped into it.

When the cast has set, it may not draw out of the mould readily, because of undercut portions of the mould. In that case it may be necessary to crack the mould to release the cast. These masks are just the thing for a hallowe'en party and also make attractive ornaments for your room.

Handy Workbench Is Equipped With Home-made Vise



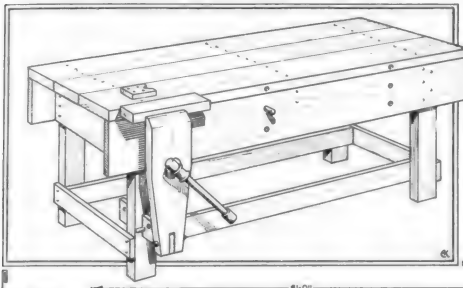
The above drawing shows the details of the vise. The wooden jaw is adjusted with the iron bench-screw and sliding strip at the bottom of the vise. A piece of work is gripped so that the lower part of the jaw is directly beneath the upper part.

In constructing the workbench, the end frames are assembled and then connected together with front and rear aprons and nails, as shown in the drawing above. At the center of the aprons a 2x4 is nailed to give rigidity. This finished, the top boards are glued or screwed on.

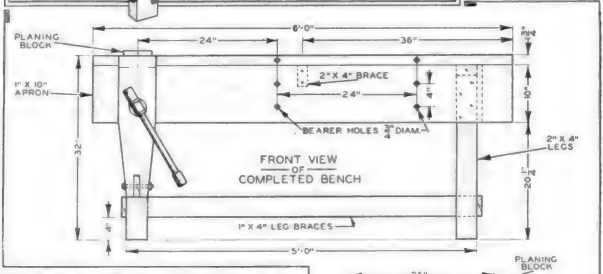
OF ALL the various types of workbenches that home workshop fans use, the simplest and most easily made, and at the same time most handy and efficient, is the type illustrated in the drawings in this article. It is an old timer as to type, but has no peer among the simpler jobs. It is equipped with a sturdy, home-made vise, with an iron screw and wooden jaw. For a bench six feet long, 25 inches wide, and 32 inches high, the following material is required:

1 pc. 1″x 4″x10′ for rails and sliding strip
1 pc. 1″x 4″x 6′ for rails
1 pc. 1″x10″x12′ for aprons
1 pc. 1″x10″x 4′ for aprons
1 pc. 2″x 4″x10′ for legs and plates
1 pc. 2″x 4″x 8′ for legs and plates
1 pc. 2″x 8″x 2′ for vise jaw
1 pc. 2″x 6″x12′ for top
1 pc. 2″x10″x 6′ for top

Dimensions for cutting the bench parts are given in the accompanying drawings. First cut the legs, plates, end rails, end aprons, then assemble the end frames as shown in the drawing at the top of the page.



The completed bench is shown in the drawing at the left. The holes in the front apron and in the edge of the bench top are for the adjustable peg that supports ends of long pieces placed in the vise. The stop at the left end is made of a block of wood with a V cut in it. A home-made vise with an iron screw and wooden jaw is shown in the plans but a steel vise can be substituted.

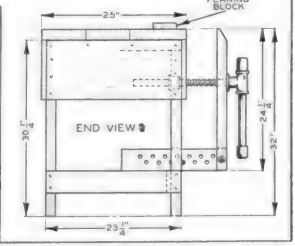


The above drawing shows a front view of the workbench. All dimensions are given, so that the craftsman will find construction easy.

When the end frames have been assembled, stand them up and connect with the front and rear aprons and rails, using lag screws or bolts. After a 2x4 has been set between the aprons, at the center, glue or bolt on the top boards, countersinking the heads if bolts are used.

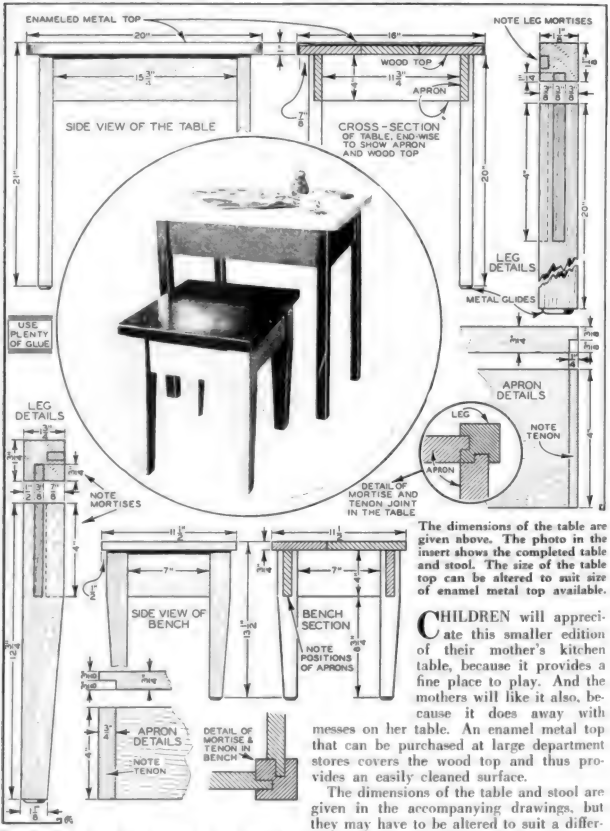
The dimensions of the bench-screw vise are given in accompanying drawings. A mortise is cut in the bench leg for the sliding strip which is held in place by an iron peg through the holes. When work is placed in the vise, the peg must be adjusted so that the lower part of jaw is kept directly under upper part.

Holes are drilled in the edge of the bench top and in the apron to support long pieces held in the vise. There should also be a bench-stop at the left end of the bench. This is made of a block of wood with a V cut in it. Adjustable iron stops, however, are more satisfactory. A steel vise may also be used instead of the wooden one.



This end view shows the construction of the vise. The sliding strip is mortised into the jaw and held with an iron pin through the holes.

A Midget Table and Stool For the Children's Playroom



Details of the bench are shown in the drawings above. Note that the legs are joined to the aprons with mortise and tenon joints, which should be glued together. The bench should be made firm and rigid to withstand rough usage.

The dimensions of the table are given above. The photo in the insert shows the completed table and stool. The size of the table top can be altered to suit size of enamel metal top available.

CHILDREN will appreciate this smaller edition of their mother's kitchen table, because it provides a fine place to play. And the mothers will like it also, because it does away with messes on her table. An enamel metal top that can be purchased at large department stores covers the wood top and thus provides an easily cleaned surface.

The dimensions of the table and stool are given in the accompanying drawings, but they may have to be altered to suit a different sized table top. Cut the legs out of hardwood of close grain and mortise them to receive the ends of the aprons, which should be tenoned, as shown. The success of the

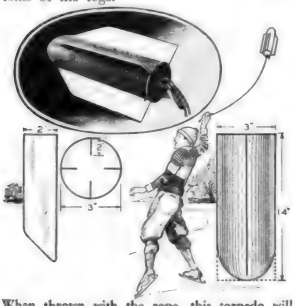
job depends upon accuracy of laying out the mortises and tenons and exactness in cutting.

When the mortises and tenons of the table and stool have been cut coat the tenons with glue and drive them home in the mortises. Finally, reinforce the joints with finishing nails.

Next, cut the table sub-top. Unless you use plywood, make this of two boards. Place them upon the table framework, with ends projecting equally all around and nail to the legs and aprons. Then round off the corners and trim off the edges of the boards until the rim of the enamel top can be forced down evenly on all sides. Finally, rub down all wooden surfaces with sandpaper, set nail heads, putty the holes, and finish with two coats of a bright color of enamel or lacquer. Then purchase four metal glides, of the type known as "domes-of-silence," and drive one into the bottom of each leg.

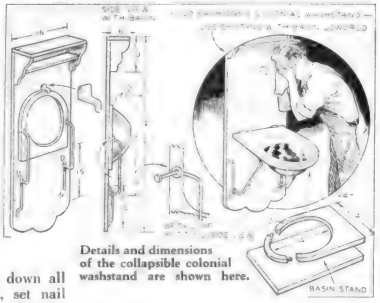
The construction of the stool is similar to that of the table, except that the legs are made of thicker stock, to stand rougher use. Rabbet the aprons to form the tenons and mortise the legs as shown in the accompanying drawings. Then glue up the parts. Make the top 11½ inches square, and glue and nail it to the legs and aprons, leaving equal projections all around.

Finally, finish the stool to match the table, and drive metal glides into the bottoms of the legs.



When thrown with the rope, this torpedo will strike forth in a straight line across the ice.

An Attractive Colonial Washstand



Details and dimensions of the collapsible colonial washstand are shown here.

IF YOU are partaking of the present day enthusiasm for antique furniture, you will find the colonial washstand shown in the drawing above just the thing for your washroom. In constructing it, the first thing that you will need is the main frame board, which is a piece of oak, 16"x4'x1". The bottom is cut with a band saw into any design you wish, and a small shelf is built on the top.

The semi-circular basin holder is made in two different parts. The front part is cut from a straight hardwood board, 1½ inches wide, the ends being doweled and glued to the rear part as shown.

The sliding and support rods are made of ¼-inch iron and bent as illustrated in the drawing. The basin to be used is to be 13½ inches in diameter.

An Ice Torpedo for Winter Sports

A VARIETY of stunts can be performed with this novel ice torpedo, shown in the drawing at the left. To make it, procure first a wooden cylinder three inches in diameter and 14 inches long. Then make four lengthwise saw cuts in it, each ½ inch deep, and into these cuts insert four fins, made of pieces of heavy-gauge sheet iron two inches wide and 12½ inches long. A six-foot length of sash cord is attached to the rear with a screw, so that the torpedo can be thrown across the ice. You can devise a number of games to play with this torpedo while skating with friends.

Trapping Animal Gangsters

Winter is the season when the sleuths are busiest. In the photo above are shown two notorious wolves which were trailed and shot by government hunters.

"BRING him in, dead or alive!" This square-jawed sentence sounds like parting words of advice to a posse of deputy sheriffs. But in this case it does not apply to man trailers but to animal hunters. It is the slogan of the super-sleuths of Uncle Sam, now engaged in a relentless battle against a vast animal underworld with headquarters in the great Western stock country.

All through the range lands these daring and persistent men trap the wary wolf, poison the cunning coyote, and shoot the meat-hungry grizzly bear and mountain lion. Oftentimes they spend months and even years trailing a single murderer.

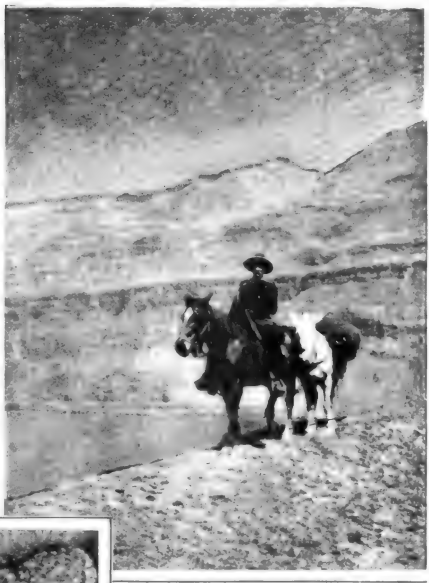
Brimful are the records of the Biological Survey with accounts of the killing of predatory animals that have made remarkable reputations for cunning and destructiveness. An Arizona grizzly, for instance, had been killing cattle every spring for 10 years, and stockmen had offered bounties for his hide ranging from $100 to $500, but private hunters and trappers had simply wasted their time in trying to get the marauder.

Future killers. A young coyote and bob-cat dug from their dens by a government hunter.

However, a hunter employed by the

by **JAMES NEVIN MILLER**

The gangster is commonly thought of as a product of modern civilization, but in reality he has existed since the world began among all forms of life. In this article you will read of how the predatory animals are preying upon their fellow creatures and encroaching upon the domain claimed by man. How the forces of the United States government work to stamp out the criminals of the animal world constitutes a story as gripping as any detective yarn.



Above is shown a government sleuth riding his traps and poison lines in typical coyote country in Oregon. At the left is shown a trapped coyote.

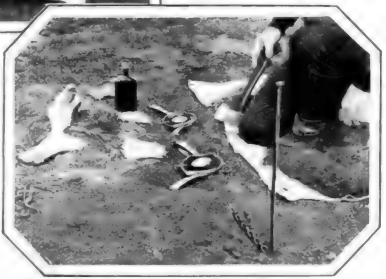
Department of Agriculture and the State of Arizona finally got him after a thrilling hunt in which the pack of dogs was whipped and the bear stopped by a bullet when he was only 15 feet away. It is estimated that in four years this grizzly killed between $25,000 and $30,000 worth of livestock, and that in his lifetime he did no less than $75,000 worth of damage to ranchers.

Many, too, are the dramatic tales of renegade wolves and coyotes, finally outwitted after months of futile trailing. One day, not so long ago, a government hunter in the state of Washington trapped the Hanford wolf, an elusive killer that had been making depredations on livestock for more than two

The skin and skull of a 1,500-pound grizzly bear which was stopped by a rifle bullet when only fifteen feet away from this government hunter. It did $75,000 worth of damage.

But perhaps the prize yarn of all concerns the famous Lobo wolf. After two years as king of the range during which he successfully matched his cunning with every artifice of ranchmen and hunter to effect his death, and cost cattlemen thousands of dollars annually in stock depredations, his reign ended abruptly a couple of years ago when M. E. Musgrave, famous predatory animal inspector of Arizona, brought him down thirty miles east of Kingman, Ariz. The entire dramatic story is thus described by Mr. Musgrave himself:

"When I arrived at Flagstaff the latter part of August I received a letter from the Carrow Brothers Cattle Company, of Kingman, Ariz., telling me that the old wolf which had been on the range for several years was



Coyote and wolf traps are placed across the commonly used trails and carefully covered with a thin layer of loose earth.

years, during which time it is believed that he destroyed at least $5,000 worth of stock. He was finally caught in a trap that had been concealed carefully along one of his trails. He dragged the trap and chain nearly seven miles before the hunter overtook and killed him!

In bringing in these old trap-wise animals, hunters sometimes need the last ounce of patience they possess. One hunter tried for many months to catch an aged female wolf that had lost a foot in a trap and had become so cautious that every trap failed to hold her. She also refused the attraction of poisoned bait. Whereupon the hunter took his bed near a water hole along one of her trails and stayed there every night. Finally he shot the three-footed wolf within ten feet of his bed!

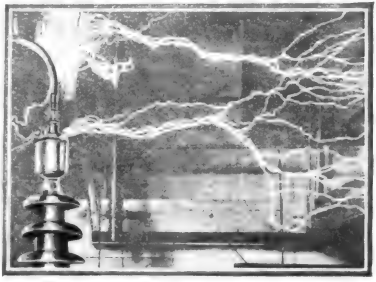
exceptionally active and was killing great numbers of calves. The Carrow Brothers raise purebred stock and, of course, the yearlings are quite valuable. I had sent two different trappers after this wolf in the past three years without success as he covered a big range and only passed over his routes about once every two weeks.

(Continued on page 196)

THE AMATEUR ELECTRICIAN

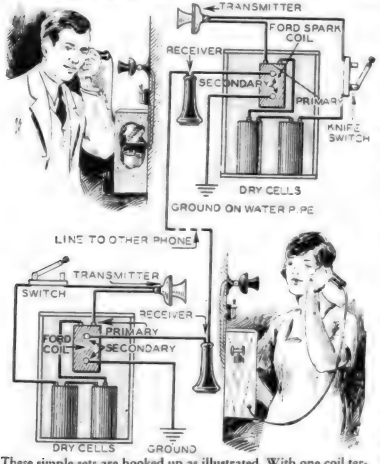
Edited by
THEODORE ALLEN

Experimenting with electricity is a most fascinating and instructive pastime. This month, Modern Mechanics and Inventions presents to its readers plans for making apparatus with which both the practical and theoretical side of electricity can be studied. Editors of this department always stand ready to assist readers in any way possible.



Talk to Your Friends Over These Simple Telephone Sets

RIGGING up a telephone connection with which you can talk back and forth to your neighbor at a distance up to a mile is an extremely easy matter. The only parts you need for each set is a transmitter, or microphone, and receiver, a Ford spark coil, a knife switch, and between two and five dry cells, depending upon the distance.



These simple sets are hooked up as illustrated. With one coil terminal grounded, only a single wire is strung between the sets.

These parts are wired up with the circuit shown in drawing at the left. The microphone, dry cells, spark coil primary, and knife switch are all hooked in series to form the transmitting circuit of each set. One side of the spark coil secondary in each set is grounded to a water or gas pipe, or to any other firm ground connection. The other terminal of each coil is attached to the telephone receiver. Now to the free terminal of each of the telephones is fastened the wire which serves to hook up the two sets, this being the only connection between them.

For neatness sake the individual sets can be mounted on a board to look like the old fashioned wall telephone. The dry cells and coil should be placed in a small box which is fastened to the bottom of the board. Just above it is screwed the knife switch and the microphone. Several nails will hold the receiver.

A High-voltage

Here's a simplified Toepler-Holtz static machine for generating high-voltage electric sparks. By experimenting with it you can learn something about the nature of electrical currents.

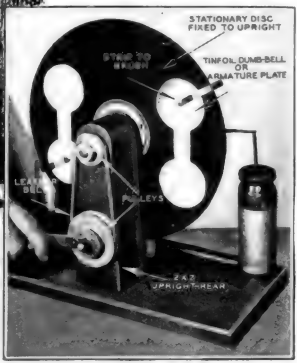


Fig. 1. This rear view of the static machine shows the dumb-bell shaped armature plates on the stationary disc and the pulley system by means of which the front disc is made to rotate.

IF YOU are interested in learning the nature of that mysterious and invisible force known as electricity, there is no better means of studying it than by experimenting with this inexpensive and easily made static machine. This is not a machine, mind you, which makes that awful noise in your radio receiver, but a device which generates high voltage electric sparks which are quite harmless, but with which you can have barrels of fun. It is of the Toepler-Holtz type which is used in most school physics labs to demonstrate the strange things that electricity can be made to do.

Where the Toepler-Holtz machine uses glass discs, this generator uses old twelve-inch phonograph records that are too worn and old to be of any further use. After the surfaces have been scrubbed thoroughly with soap and water and a stiff-bristled brush to remove dirt and bits of metal that might be hiding in the grooves, several coats of shellac are applied to one side of each disc, each coat being allowed to dry thoroughly before the next is applied.

While the shellac is drying you can construct the woodwork that holds the rear disc rigidly in a vertical position while the front one is being revolved rapidly to generate electricity. The bottom portion of the base—the base on which the entire machine is mounted—is simply a board 7½ inches wide and 16 inches long, with edges slightly bevelled. Halfway between the ends, and at one side of the center, an upright, 2x2 inches at the bottom and nine inches high, is mounted, as shown in Fig. 1. This upright supports the stationary record and the belt pulley driving mechanism for the rotating one.

Through this wooden upright, two ½-inch holes are bored, one near the top and the other near the bottom. Into the lower one a 3½-inch section of ½-inch shafting is wedged, so that a large diameter pulley wheel can turn on the ¾-inch portion that projects beyond the surface. A similar shaft about four inches long is inserted in the upper hole, on one end of which is mounted the revolving disc, as shown in Fig. 5. A small pulley is mounted on the outer end of this shaft as shown in Fig. 1. These pul-

Spark Generator

by WALTER E. BURTON

[illegible] the shafting, and belt can be purchased at any five cent-to-a-dollar store, or at any mail order house.

With the records dried out thoroughly, and the pulley system completed, you are now ready to go to work on the records again. First cut ten discs from tinfoil, each 2½ in. in diameter, and two strips, each ¾ in. wide and about four inches long. Using shellac as an adhesive, mount six of these discs on the shellacked face on one record, spacing them evenly—60 degrees apart—with the edges of the tinfoil about ¾-inch from the outer edge of the disc, as shown in Fig. 2. These form the plates on the rotating disc.

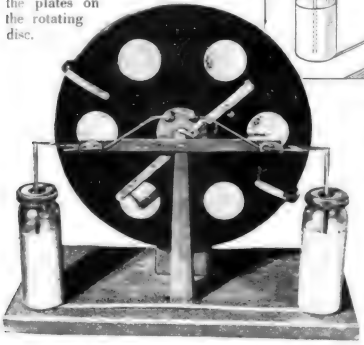


Fig. 2. A front view of the completed static machine. Sparks generated by the revolving disc jump across the ball gap.

To the shellacked surface of the second record, mount four of the discs and the two strips, so that the arrangement resembles two dumb-bells parallel to each other, and opposite sides of the center hole as illustrated in Fig. 1.

Next ream out the center holes of the records to a diameter of ½ inch, then drill two smaller holes on each side of the larger ones, about ¾-inch from the center. Through the center holes in the disc with the dumb-

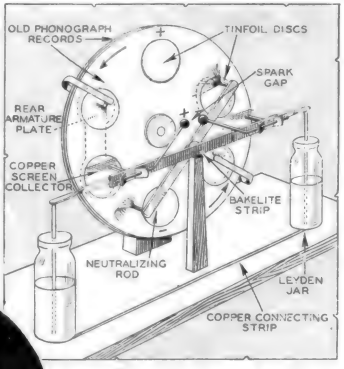


Fig. 3. This drawing gives a clear idea of the construction of the various parts, including the neutralizing rod, collectors and brushes, Leyden jars, spark gap, and revolving disc, which is attached to pulley system in rear.

bell shaped armature plates are inserted flat headed bolts by means of which the stationary disc is fastened to the rear wooden upright. The corresponding holes in the disc with the six tinfoil discs—the one which revolves—takes the bolts which fasten it to the wooden disc, as shown in Figs. 2 and 6. This wooden disc is attached to the shafting by means of a pin.

With this arrangement completed you should be able to rotate the disc with the six tinfoil plates by turning the crank on the rear wooden upright.

The next job is to make the four brushes which produce the static charge by rubbing against the outer disc as it revolves. These consist of lengths of fairly stiff copper wire bearing little bundles of tinsel, such as that used in trimming Christmas trees. Two of these brushes are attached to the ends of the small brass strip which extends

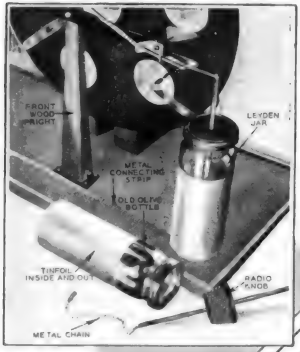


Fig. 4. The Leyden jars and connections are made as shown above. The chain serves to connect the inside coat of tinfoil to the rod.

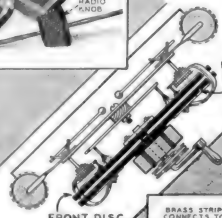


Fig. 5. This top view shows position of brushes.

around the edges of the discs and are bolted to the center of the tinfoil dumb-bell on the rear record, as shown in Figs. 1 and 6, which give rear and front connections, respectively.

The two other brushes are fastened to the ends of the neutralizing rod, as shown in Fig. 3. This neutralizing rod is a brass or copper strip, seven inches long, and fastened to the front upright in such a position that the two tinsel brushes at the ends form an electrical connection between the two opposite tinfoil discs.

The task of making the collectors for taking off the electric charge and storing it in the Leyden jars now presents itself. These consist of short pieces of copper screen wire, as shown in Figs. 3 and 6, that are supported so that one is on each side of the center, opposite the foil discs, and at the same height from the base as the center of the record. The screen wire points are placed so that they are close to the record, but do not touch it.

The rods holding the copper screen collectors are supported by a bakelite strip which is screwed to a wooden upright mounted on the front of the base. This same bakelite strip also supports a spark gap made of two long brass rods, on the ends of which are soldered large ball bearings, as shown in Figs. 2 and 3. Also, at the points where the screen collector connects with the spark gap, brass or copper strips are fastened which run to the Leyden jars that serve to store up the electric charge.

The Leyden jars are made by cementing with shellac tinfoil to the inside and outside surfaces of two olive bottles, the foil covering the lower two-thirds of the jars. The two outside foil surfaces—really the plates of the two Leyden jar condensers—were connected together by means of a copper strip, as shown in Figs. 2 and 3. The inside coatings are connected to the collectors by metal chains, shown in Fig. 4.

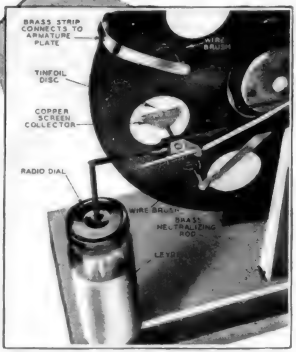


Fig. 6. The Leyden jar is connected with the copper screen collector and spark gap as shown in the photo. The brushes which are attached to the end of the strip that connects to the armature plate and to the end of the neutralizing rod are also shown.

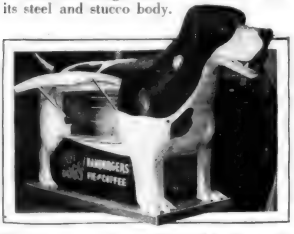
Outboard Motor Saves Fish From Suffocation Under Ice

In order to save the suffocating fish, Mr. Wilson rigged up his Big Twin outboard motor as shown above, and created an aerated lake with enoughfresh water to save the game fish under the ice.

Mammoth Dog Vends Hot Dogs

IN AN effort to create something new in the way of hot dog vending stands, Mr. Henry M. Lake, a restaurant owner of Cottage Grove, Oregon, designed himself a mammoth wooden dog, which dispenses the well known wiener in a bun sandwich.

This huge canine is eighteen feet long and eleven feet high, and has all modern conveniences — electricity, frigidaire, hot and cold running water—contained within its steel and stucco body.



This mammoth canine, which is 18 feet long and 11 feet high, vends hot dogs and hamburgers.

OUTBOARD motors, advertised by manufacturers as a most valuable aid in transporting fishermen to the scene of their nimrod activities, take a new role in the winter—this time, strange as it may seem, assisting the fish.

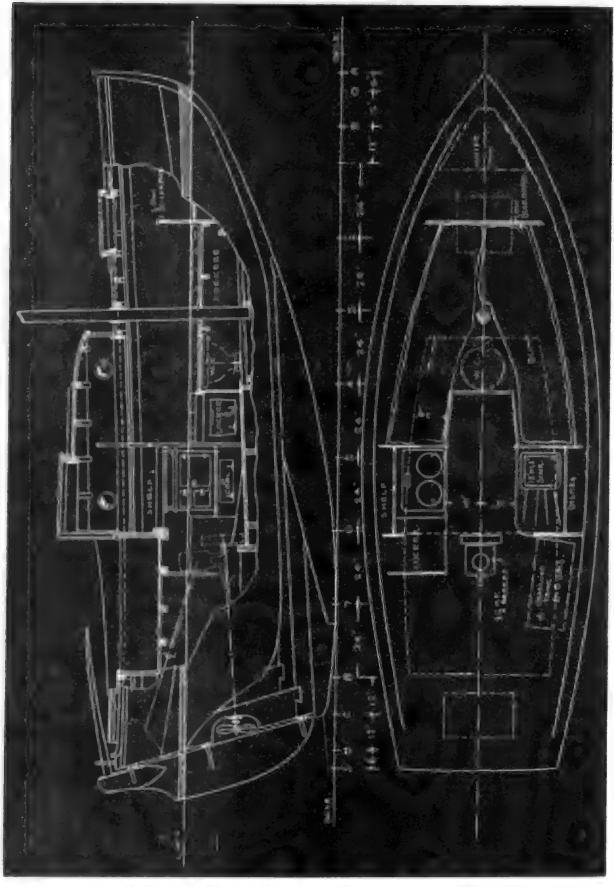
When called upon to save the fish from suffocation under the ice in a small lake near Goodwin, S. D., Mr. W. T. Williams, owner of a Johnson big twin outboard motor, built a wooden boat frame to which to attach his motor, and hung it at a tilt in an ice hole about three feet by six feet in size. About three hundred feet from the motor he cut five holes, each three feet in diameter, as shown in the drawing above.

The big twin was started and ran six days and nights constantly. About every six or eight hours, the motor had to be moved back several feet on account of the washing away of the ice, which at that time was about thirty inches thick.

During the six days a crew of fishermen seined about seven hundred and sixty dollars worth of scavenger fish from the lake.

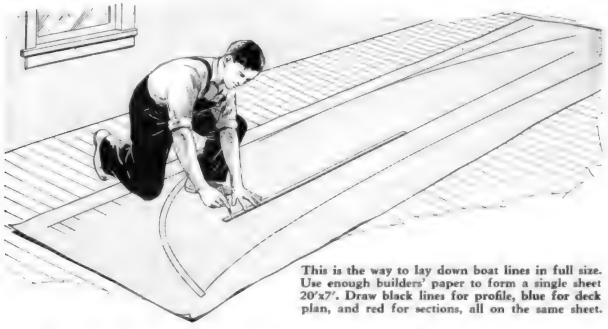
Several times, after continued cold spells, the state game and fish commission have aerated the different lakes in this manner.

Compact Comfort and Convenience Are Shown in These Interior Plans



This blueprint shows in detail the interior arrangement and construction of the "Waterwitch."

Plans for "Waterwitch"



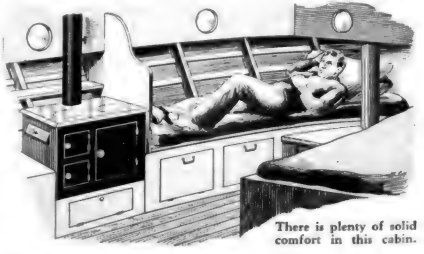
This is the way to lay down boat lines in full size. Use enough builders' paper to form a single sheet 20'x7'. Draw black lines for profile, blue for deck plan, and red for sections, all on the same sheet.

Here are the rest of the plans for constructing William Atkin's snug little auxiliary cruiser. These plans and instructions are so complete that anyone handy with tools may turn out a boat of which he may be proud. Last month we finished the keel and frames, now we start the planking.

PART II

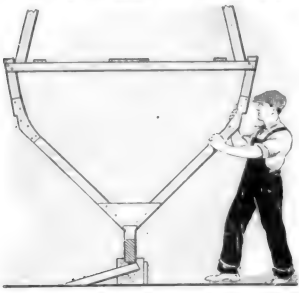
IN SOME parts of the country it may be difficult to get good oak; I would then use the best grade of long leaf yellow pine for the parts mentioned which are to be made from oak. Tough grained fir might be used also; if it is, make the frames slightly larger in section so as to keep the weight and strength equal with that of white oak.

Because of the wide spacing of the frames the seams of the planking must be backed by battens. These have to be let in flush with the face of the frames and now that the whole frame is set up is the time to get the battens out and apply them. The battens for both the sides and bottom will be made from ⅜ in. by 2½ in. white oak or some other equally hard wood. There will be six planks each side below the corner of the chine. This means five battens. The planks nearest the keel will be the widest, about 9 in., the next out will be 8 in., and the other four approxi-



There is plenty of solid comfort in this cabin.

How the Frames Are Constructed



The frames will be cut and bolted together with galvanized iron bolts before erecting. Be sure to get the frames square across the center line.

mately 6 in. in width at the widest part of the boat.

The chine log will be made from ⅞ in. by 3 in. oak in a single length and if this cannot be obtained use hard yellow pine. Like the battens the chine logs will have to be let into the frames until they come flush with the faces of the frames. This will have to be very well fastened into the frames and the chine knees, using ¼ in. diameter galvanized bolts. At the bow end of the boat the chine log must be mortised into the side of the stem; and at the stern into the cleating.

Putting on the Planking

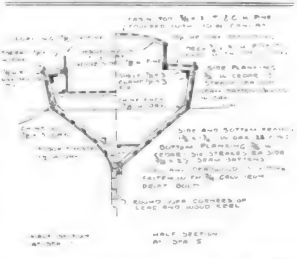
There will be three planks on each top side and this will mean two battens of the same size as those on the bottom of the boat. The battens will be fastened to the frames with long galvanized nails or screws, being careful to mark the fastenings so as not to be running afoul of them when putting on the planking.

The planking on the bottom and sides will be made from ¾ in. thick white cedar. After all cedar is the best wood known for planking any kind of small boat. It swells quickly, is very strong, bends easily and for these reasons is justly considered about the best boat-building wood. I think it, or its sister, juniper, can be gotten almost anywhere. Lacking white cedar use Philippine mahogany. Here is a first class material that is inexpensive, strong and very good looking. There is no use in shaping the bottom planking. The first, or garboard plank will be made and fitted. The way to arrive at the correct shape is to make a spiling board of basswood fitting this roughly to the rabbet and being careful not to spring it crossways. The spiling board is used as shown in the sketch, Figure 10. It is simply a template for arriving at the shape of the rabbet.

The planks will be fastened with brass screws both along the rabbet line and on the frames. There will be four screws to each frame in the wider planks and three in those that are six in. wide. The planks, of course, taper forward and aft and where they narrow up two screws will be enough. Where the planks come in the S sections from Station 6 and aft the backs must be planed convex so as to land on the frames for their full width. If this is not taken care of and the planks are forced into the hollow sections here they will split when the screws are taken up snug. At the corner of the chine the planking will have a square edge; this will butt against the bottom edge of the side planking and after it is all securely fastened will be caulked. Figure 11 gives the details for doing this part of the work.

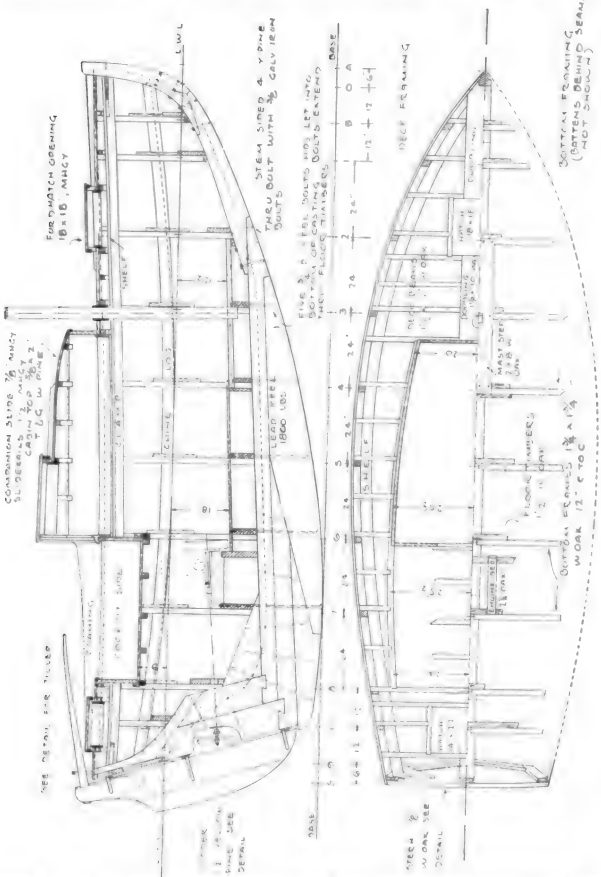
It will not be easy or economical to use planking in single lengths and therefore some of the planks will have to be butted. The butts should come between the frames and will be at least 6 in. long and about an inch wider than the width of the plank at the place of the butt. See Figure 11 for this.

(Continued on page 180)



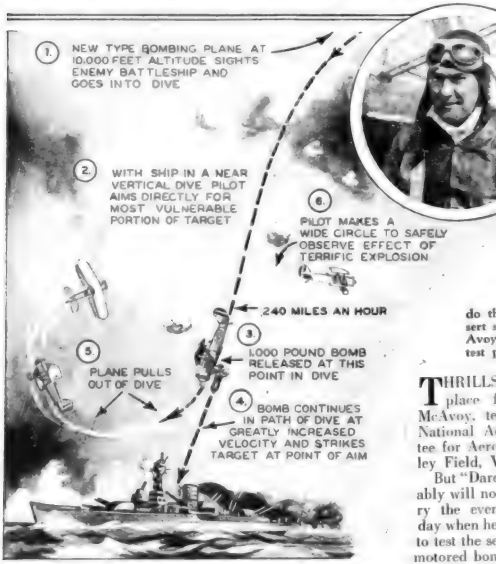
Half sections at stations 7 and 5. This drawing plainly shows the method of backing the planking seams with white oak battens.

Construction Is Made Easy With These Detailed Working Drawings



Details of deck, floor and keel construction are given in these drawings. Note placing of keel bolts.

DIVING TWO MILES *in an*



This is how the new bomber may "lay her eggs" where they will do the most good. Insert shows William McAvoy, the Navy's ace test pilot.

THRILLS are commonplace for William H. McAvoy, test pilot for the National Advisory Committee for Aeronautics at Langley Field, Va.

But "Daredevil Bill" probably will not forget in a hurry the events of the other day when he was called upon to test the sensational single-motored bombing plane just developed by Glenn L. Martin.

After a graceful takeoff from the Naval Air Station near Washington, D. C., McAvoy climbed to an altitude of about 11,000 feet. Whereupon things began to happen. First the ship suddenly nosed over and dived straight down for more than a mile while Bill felt a terrific tug at his safety belt, meantime realizing fully that slung under the plane was a 1,000 pound dummy bomb, thereby freighting the ship so heavily that at any moment one of the wings might tear off.

Which was exactly what did happen. Socko! Just before the dramatic dive ended, the lower right wing caved in completely, the outer covering ripped off and the metal ribs began whipping back and forth into

The half-ton missile in its carrier beneath the bomber.

"EGG-LAYING" Bombing Plane

Sturdy wing construction and extreme maneuverability are evident in this photo of the bomber.

the wind.

Not a whit dismayed, McAvoy took a firm grip on the controls, got the ship in hand just in time to save the entire wing from collapsing, and landed safely.

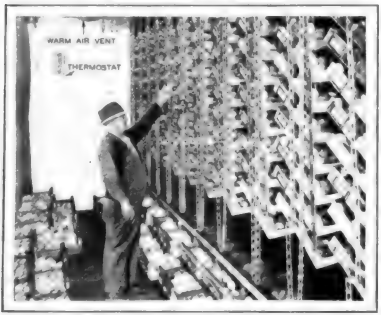
What the government experts have been striving for in their tests with the "egg-laying" plane is to develop a ship strong enough to make a 10,000 foot power dive while carrying a 1,000 pound combat bomb. So that, following McAvoy's first experimental flight, the wings on the new plane were made far more durable.

The lower right wing caving in under the terrific strain of the 10,000 foot power dive on the new bomber's first test flight.

A few days later McAvoy once more took the ship up, carrying the regulation 1,000 pound bomb. This was the first time in history that a plane had withstood the terrific beating of carrying a 1,000 pound bomb straight down from the skies for nearly two miles, at more than four miles a minute, and then, still carrying that bomb, climbing up again from the dive with ease, without damage to the airplane.

In actual warfare, of course, the ship wouldn't have to carry the bomb through the pull-up. But the pilot must know that in case the bomb fails to release, his plane is strong enough to come out of the dive still freighted with its half-ton weight.

Mammoth Air Heated Incubator Hatches 50,000 Chicks



This enormous incubator has a capacity of 50,000 eggs, and is automatically heated by a draft of warm air from the ceiling.

AT a poultry farm in southern California they turn out baby chicks by the thousands, in fact, by the fifty thousands. To effect this mass production they use a sleeping car type of incubator, which is located in a large room, as shown in the photo at the left. The air of this room is kept constant at a temperature of 99 degrees F. by means of a thermostat and is changed every three minutes.

The entire incubator is laid out in two rows which are on each side of the central aisle, with twelve tiers on each side. The eggs are held in trays, of which there are 216 all told, holding 150 eggs each.

The trays are fastened to a set of chain conveyors by means of sprocket wheels, so that the eggs can be turned through an arc of 270 degrees. By this same means the eggs are carried through incubator on an 18-day trip.

Ship Model Wins Championship

EACH year a Championship Cup is competed for by model-makers in all parts of Great Britain. The competing models are exhibited in London, and a committee of expert judges select the best model of the year.

The present holder of the cup is Richard Frederick Bell, who is shown with his prize-winning model in the photo below. Mr. Bell's successful model is a small scale reproduction of the passenger steamer *Ben-My-Chree*, which makes a regular service between Liverpool and the Isle of Man. It is built to a scale of 3/16 of an inch to the foot, and is perfect in every detail.

Two years have been spent in building this fine model, which is valued at $1000.

This model of the steamer Ben-My-Chree, built by Frederick Bell, won the British ship model prize.

Artist's Auto Unique in Design

The uniquely shaped auto shown in the photo above is of Citroen make and was designed by Madame Delecourt, a talented Parisian artist.

ACTING in keeping with the eccentric nature of artists, Madame Delecourt, a Parisian artist has designed for herself a car that beats all for originality. The car, shown in the photo above, is of Citroen make.

Everybody Rides in New Britain

THE little south sea island of New Britain has no pedestrian traffic problems at all. The reason for this is that nobody walks; there are 500 people on the island and 500 automobiles.

Science Aids Voiceless with New Larynx

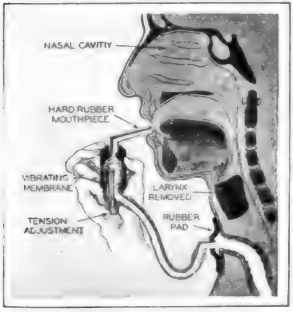
THE picture below shows two men who are carrying on an artificial conversation. It so happens that A. C. Mahon, Richmond, Va., the man on the left, underwent an operation three years ago in which his vocal cords and his windpipe were removed. Upon recovery he found himself deprived of the power of speech and was therefore faced with the difficult problem of learning some way of communicating with people who could speak.

Today he can speak with a voice that is purely artificial, although it is remarkably natural and altogether audible. This is accomplished by means of an artificial larynx, an instrument which is operated by air conveyed from the lungs from an opening in the chest, to which a tube is connected.

The instrument is movable and when not in use, it may be carried in the pocket, as it weighs only a few ounces.

The man on the right is S. P. Grace, research engineer, Bell Telephone Company. He has the use of his voice, though for demonstration purposes he is carrying on a conversation. The instrument that he is using is an improved artificial larynx, but it is designed entirely for persons whose lungs are paralyzed and could not, therefore, use the other.

A. C. Mahon, voiceless for three years, is shown talking to S. P. Grace, Bell Telephone research engineer, right, with aid of an artificial larynx. The improved artificial larynx, being demonstrated by Mr. Grace on the right, is bellows operated and even artificial air must be secured to speak with it. Other construction is the same.



The drawing above illustrates how the lung powered larynx is connected to opening in throat.

Compact Toaster for Marshmallows

THE latest thing in electrical household appliances is an electrical marshmallow toaster which toasts both sides of the confection at once. Ladies will find this little device useful for entertaining at bridge parties, as they permit the preparation of dainty desserts on the dining table. Six marshmallows may be toasted at once, and enough of the tid-bits for a large party may be toasted in a very few minutes.

This toaster toasts six marshmallows at once.

A FLYING

The correct pose for launching the model sailplane is shown in the drawing at the left, while the photo above pictures the graceful four-foot craft in flight.

MOST of the thrills and none of the hazards of glider flying can be enjoyed by the model builder. After seeing about 1200 feet of 16mm. Cine Film demonstrating what Mr. W. H. Bowlus could actually do with his All-American Sailplane, the writer decided that the most economical way in which he too could participate in the soaring field was to build a scale model. The large Bowlus Sailplane was examined thoroughly and much helpful information was secured from Mr. Bowlus at first hand. Construction of a man-carrying machine of this type was carefully studied and all helpful data incorporated in the design of this model. Its success in flying was astounding.

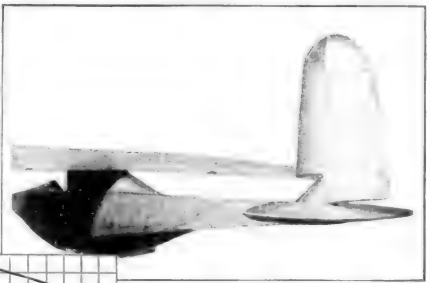
The finished model had to be balanced for flight in somewhat the same manner as a large man-carrying glider. Small strips of lead were wrapped with tissue paper and inserted in the nose of the fuselage in lieu of a live pilot. The tissue paper keeps the lead together and in place, also allowing it to be slightly shifted forward or backward to better control flight as the operator wishes. A knife edged point of balance was placed under the skid directly under the point of lift of the wing. This point of lift, called "center of lift," is about one-third back from the leading edge of the wing. When this is done correctly the glider will fly.

It is common policy to place the ribs one foot apart when building large gliders. The writer departed from this policy and placed a rib every two inches along the wing, one inch representing one foot on the large machine. This method saves weight and the ribs do their duty of maintaining the airfoil very nicely. Unlike the internal construction of Mr. Bowlus's glider, this model has the German type cantilever box spars. Balsa wood strips $\frac{1}{8}$"x$\frac{1}{4}$", are cemented in notches cut in the top and bottom of the ribs and little sheets of Japanese rice paper cemented with bamboo varnish to the top and bottom strips on each side, between the ribs. This forms a box spar between each rib. The top surface of the wing spars is kept horizontal, the lower surface slants up. This gives a slight dihedral to the lower surface of the

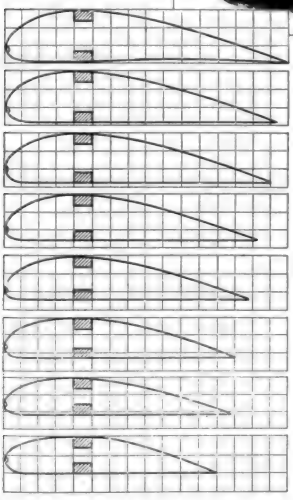
Model Sailplane

by LIEUT. H. A. REYNOLDS

The Bowlus Sailplane, holder of the American record for sustained flight, is here presented as a four-foot model whose gliding ability rivals that of its famous full-size brother—and it is easy to construct.



View of the completed glider from the rear. Japanese rice paper or thin silk is used for covering.



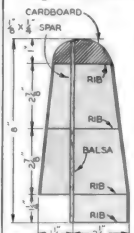
Rib pattern. Squares are ¼-inch. Make 10 of the top rib and two each of the other seven.

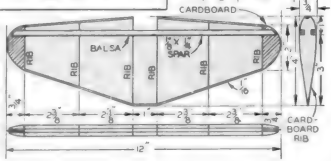
wing. In order to keep the wing as thick as practical, the taper-in shape is obtained by slanting the trailing edge forward and uniformly thinning the wing out to the tips.

The rib construction is very interesting. The airfoil selected closely follows the U.S.A.35. The ribs may be cut from strips of 1/16" balsa wood. The writer used cardboard of a thickness such as is used for writing-pad backing. Holes were pierced along the center line of these ribs with a ticket punch to reduce the weight. An accompanying drawing gives shape of ribs and number required of each. Tin wing connection plates are cut 1¾"x1½" and placed on the main spar and the subspar so that they project below the wing to connect it to the fuselage. Opticians' glass screws and ambroid can be used in securing these connection plates. Cardboard wing tips are cut and cemented to the bottom of the top spar strip. The leading and trailing edges of the wings are strips of ¼" balsa wood cemented to the ribs and wing tips.

In cementing the framework of this model ambroid liquid cement was used. The Japanese rice paper is cemented to the framework with Ideal bamboo varnish, full strength, and when dry it is given a coat of dope composed of the bamboo varnish diluted half and half with lacquer thinner. Ambroid and bamboo varnish can be secured from any model airplane supply house.

The fuselage represents true American





Balsa spars are used for rudder and stabilizer, with cardboard ribs. The tail units are glued in place with ambroid in position for normal straight flight. If knocked off, they can be re-glued.

design. Much help was gained in the designing of this model fuselage from Mr. Bowlus's article in MODERN MECHANICS of January, 1929. Diagonal bracing is effected by strips of bond writing paper cut about ¼" wide and secured with clear bamboo varnish. The longerons, uprights, and cross pieces are made of 1/16" square strips of balsa wood.

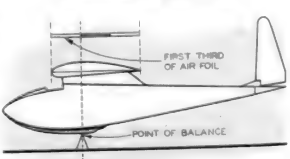
Two main bulkheads are built up of 1/16" balsa strips and covered on both sides with bond paper. This paper covering is given one coat of dope to harden and draw it tight. Three sub-bulkheads are made in the same manner to go between the fuselage and the front portion of the skid. The skid is made of spruce soaked in hot water and bent to shape. It is cemented in place with ambroid after the fuselage is covered. Two sub-bulkheads can be made to effect a cowling on top of the fuselage in front of the cockpit.

The balanced stabilizer is built around a cantilever spar composed of 1/16"x1¼" balsa strips with rice paper cemented on both sides between the ribs. Six cardboard ribs are required. The stabilizer tips are cut out of cardboard and cemented to the underside of the top spar strip. The leading and trailing edges are 1/16" balsa cemented in place.

The rudder is made in the same manner as the stabilizer. It is built around the same type of spar and is approximately one-half of the stabilizer in an upright position. This high type of rudder has a torque effect in banked flight which tends to keep the model level. Both the rudder and stabilizer are cemented onto the fuselage after the paper covering has been applied and doped.

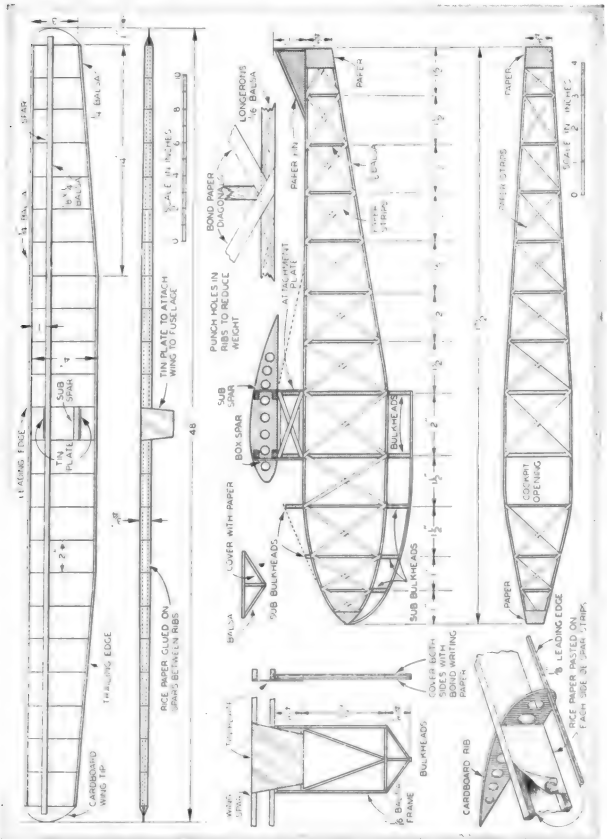
Thin silk cloth can be used in covering the wings, fuselage, and tail control surfaces. It is very strong when doped and shrinks tight. The writer used Japanese rice paper in place of cloth. It proved very easy to apply and strong enough to be practical. In covering the wings it is best to start at the bottom of the spar and work back to the trailing edge, then up over the top of the wing and around the leading edge, finishing up by overlapping the starting point on the bottom of the spar. Apply an even coat of glue, or full strength bamboo cement, to the wing tips and the bottom of the spar. Draw the covering tight from end to end and press it down on the glue. When the glue is dry trim off

(Continued on page 186)



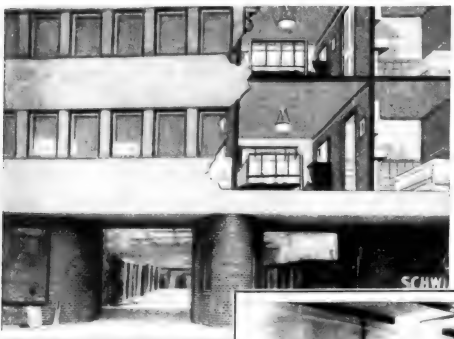
The model should be balanced on a knife point, as explained in the article, for perfect flight.

Wing and Fuselage Dimensions Given in Drawing; Braced with Paper



Note the ingenious use of thin strips of bond paper for bracing the fuselage. Holes are punched through the cardboard wing ribs with a ticket punch to lighten the weight. The use of rice paper on the spar strips insures light, sturdy construction.

New Berlin Hotel Has Rooms for Cars and Chauffeurs

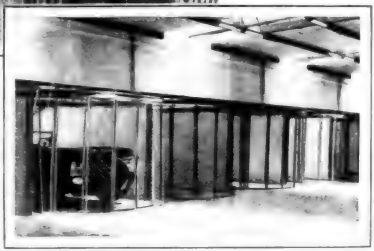


Upstairs above the garage, there are well appointed quarters for chauffeurs, who communicate with their employers by telephone.

THE last word in garages has been introduced in a large and exclusive hotel which has recently been erected in Berlin, Germany. Accommodations are furnished not only for the cars, but also for the chauffeurs, who have well appointed quarters just over the garage.

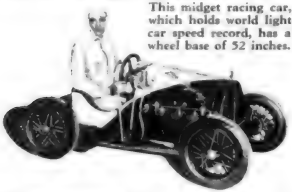
The chief feature of the new arrangement is its convenience both for car owners and for chauffeurs. The driver merely drives the car into the stall, then retires to his quarters, where he remains in readiness for his employer, who may call him at any moment by means of a phone.

The cars are kept in top-notch condition by a crew of mechanics whose business it is to overhaul the cars every night.



The autos are placed in these stalls with the thief-proof cages and are overhauled each night by garage mechanics.

626-Lb. Midget "Mystery" Car Streaks Off 91 m. p. h. Speed Record



This midget racing car, which holds world light car speed record, has a wheel base of 52 inches.

NINETY-ONE miles per hour is the speed attained by the midget "mystery" car which holds the world's record for autos weighing less than 1000 pounds. The new car, which is on display at one of New York's large department stores, weighs 625 pounds, has a wheel base of 52 inches, is 24 inches high, and 34 inches wide.

The engine is made entirely of aluminum to cut down weight, and is geared to the rear wheels by means of the chain drive system. The steering apparatus is also hooked up by means of a chain drive system, this being necessary because of the small space permitted the driver, in whom light weight is a great asset.

The midget car is about half the size of the ordinary racing automobile, but the speed it attains compares favorably with that developed by its larger brothers.

Los Angeles Kids Build Their Own Tom Thumb Course

ADDICTION to miniature golf is not being confined to grown ups; the infection has spread to the younger generation, who, following in the footsteps of the older generation, are building miniature courses of their own.

One of the most distinctive is the "Dinky" course, as they call it, which was built by several enterprising youngsters in Los Angeles. In preparing the course, they first got permission to use a vacant lot, then cut weeds, dug, and graded, laid out hazards, and constructed traps, and when the work was finished, held a grand opening, charging ten cents per round. The course, shown at right, is a model of neatness, and attracts kids from the entire neighborhood.

This miniature golf course was constructed by enterprising Los Angeles youngsters. They held a grand opening, charged a dime a round, and drew a large crowd of neighborhood kids.

How to Fireproof Cloth

TO MAKE fireproof cloth immerse the fabric in the following solution: equal parts of alum, borax, and copper sulphate, dissolved in as little boiling water as is necessary. When thoroughly soaked hang the cloth out to dry.

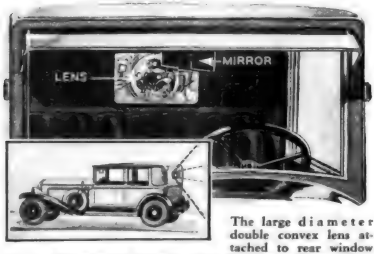
Englishman Invents Portable Player Piano Powered by Hand Pedals

VACATIONISTS have never wanted for musical entertainment on their sojourns in out of the way places, for manufacturers have been quick to meet the demand with portable radios, phonographs, and the like. And now, along comes an English inventor, W. R. Wearham, and rigs up a portable player piano which can be folded up in two sections and carried in a harp-shaped case.

Hand pedals furnish motive power for portable player piano.

The chief feature of this piano is that the foot pedal which supplies the motive power is supplanted by a hand pedal, the pneumatic action operating directly on the keyboard, as shown in the photo at the left. The piano has as fine a tone quality as any other player piano and weighs less than most portable radio sets.

New Lens for Rear Auto Window Enlarges Backward View



The large diameter double convex lens attached to rear window of a car increases the driver's range of vision as illustrated in the drawing and also cuts down glare from machines in rear.

A MOTORIST can ordinarily get a good view of only a small portion of the road behind him, and is consequently sometimes at a loss to know everything that is going on. An English manufacturer, however, has come to the rescue and put on the market a magnifying glass, which is a large diameter double convex lens of fairly low power, that is fitted to the center of the rear window of a car.

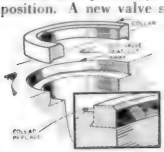
With this lens attached the motorist is enabled to get a far more comprehensive view of the road, as shown in the drawing at the left. It is also claimed by the makers that the lens cuts out the blinding glare of the headlights of following cars reflected in the windshield. The lens is easily installed.

Buildings to Have Landing Fields

A PROMINENT department store in London and a huge office building in New York are to have dirigible mooring masts on their roofs. The London store in addition will have a landing field and parking place for their private airplanes, to accommodate their flying patrons.

New Way of Reseating Valves

AN ENGLISH firm has introduced a new method of renewing worn out valve seatings in automobile engines. Instead of cutting a new seat for an oversize valve in the cylinder block, the old seat is cut away and a recess cut into the casting, the bottom of the recess being slightly undercut, as shown in the drawing below. Into this recess a collar of centrifugally cast iron is then pressed with a hydraulic press. The base of the collar has a projecting rim cast upon it which is forced into the undercut previously formed, thus positively locking the ring into position. A new valve seat to suit standard valves is finally cut in the grafted collar and the valve ground in the usual manner. Such a method reduces costs about 25%. When once installed there is little danger that the valve will give any serious trouble.



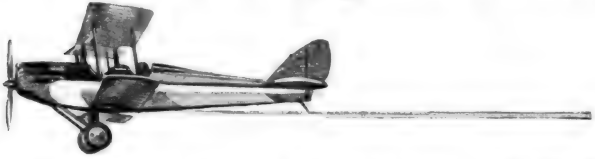
With the new method, valves are reseated by cutting out the old ones and pressing in new iron collars as shown.

Airplane and Automobile in One

In the future things like this may be seen romping up and down the highways and airways.

THERE is no telling what aviation may come to. In the future we may see such contraptions as shown above flying about.

Winners of Flying Contest No. 11



THE winnah, ladies and gentlemen, of Flying Contest Number Eleven is Harry W. Berg, who resides at 3240 South Compton Avenue, St. Louis, Missouri.

Look him over, girls! His picture is at the left, on the bottom of this page. Mr. Berg is 26 years old, has light brown hair and blue eyes. He is five feet, seven inches tall and weighs 165 pounds. And although Mr. Berg didn't tell us so, we think he must be a printer (quick, Watson, the needle), for his entry was a printed booklet, neatly bound, with the title embossed in gold leaf —really the work of a professional typesetter. And best of all, Harry made this effort worth while by really having something to say on the pages of his booklet. Mr. Berg will receive his flight training in his own home town in a school yet to be chosen.

Second prize, a real Scully aviator's helmet, goes to Miss Thelma Stolson, of Viroqua, Wisconsin. Miss Stolson is sixteen years of age, is five feet, two inches in height, and weighs 110 pounds. Miss Stolson says in part: "I want to become an aviatrix for pleasure and profit—chiefly pleasure. But such things as forced landings are not strictly pleasure. That's where I want the profit to come in; no doubt I'll need it for hospital bills . . ."

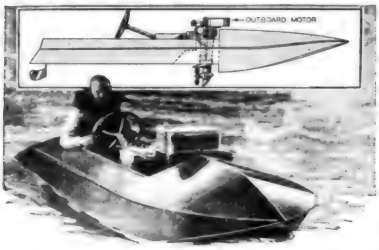
Bernard Peltier, of 1223 Ludington St., Escanaba, Michigan, wins the third prize by virtue of his artistic "spatter" drawings. Other entries which deserve honorable mention for their excellent work are Irving M. Baily, of New Haven, Conn.; Edward W. McClure, Los Angeles, Cal.; Raymond Babcock, Canton, Ill.; Esther Merchlewitz, Little Falls, Minn.; Martin A. Bystom, Elmira, N. Y.; Stanley Dziuban, Hastings, N. Y.; Warren A. Tinsley, San Francisco, Cal.; Ernest B. Carter, St. Louis, Mo.; E. J. Foster, Southgate, Cal.; R. J. Young, San Leandro, Cal.; and John C. Fogarty, of Pittsburgh, Kansas.

The eleventh free flying course goes to Harry W. Berg, of St. Louis, Missouri.

The second prize, a Scully helmet, goes to Thelma Stolson, of Viroqua, Wisconsin.

While Bernard Peltier, of Escanaba, Michigan, walks off with the goggles for third prize.

Hydroplane Defects Corrected by Front Drive Outboard



With the outboard motor installed up forward, as shown above, shorter turns at high speed are possible. Pounding, jumping, and resultant loss of speed, are also eliminated.

WITH the front drive wheel idea in automobiles proving satisfactory, motor boat manufacturers are following suit and designing speed crafts with the motor installed well up forward, as shown in the drawing at the left.

It is claimed by the designers that this method of motor installation will eliminate the inherent unstable characteristics of ordinary type of outboard hydroplanes. When steering by the stern rudder, with the motor located forward, the direction of the application of power is in the direction of the motion of the boat. Such an arrangement facilitates turning at high speed, since by having the center of gravity close to the turning center the centrifugal force on turns is lessened.

Physical soreness of the driver is also lessened due to the elimination of much of the pounding and jumping.

In Which We Apologize

IN OUR August issue there appeared, on page 177, an article entitled, "Precautions for Gas Refrigerators." The wording of this article left the reader under the impression that the precautions outlined by the New York City Health Commissioner applied to the "Gas Refrigerator" and to the "Gas Refrigerator" only. This is an error on our part. Investigation of the facts shows we may have done an injustice to manufacturer, dealers and others connected with the "Gas Refrigerator."

Dr. Wynne's article which appeared in the Journal of the American Medical Association on April 5, 1930, dealt with the safeguards applying to *all* types of automatic mechanical refrigerators.

Meter Shows Grease, Oil Mileage

This speedometer indicates just how far you have gone since last changing grease and oil in your car.

THERE is no longer any necessity for guessing as to when the grease and oil should be changed in your car, for the new speedometer shown at the left, which is set at zero when you change oil or grease, indicates the mileage.

Machinery to Eliminate Humans

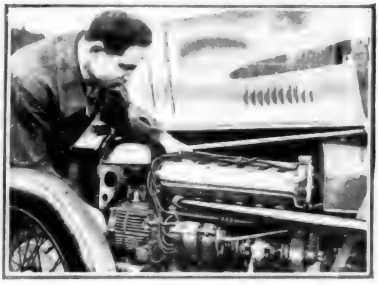
This $1,500,000 building will house laboratories of the A. C. Smith Co., research engineers.

THE last word in the elimination of the human factor in the manufacture of machinery is represented in the erection of the new A. C. Smith research engineering plant in Milwaukee which will house the laboratories of a staff of highly trained research engineers whose efforts will be directed along the lines of creating a 100% automatic frame plant, that is, a machine-perfect factory.

MOTOR MECHANICS

Edited by
RAY F. KUNS

Everybody has a car nowadays, and everybody is interested in the care of that valuable investment. This monthly department, conducted by a recognized authority in the automotive field, will prove invaluable to the motorist in caring for his machine.



Watch Manifold Heat When Driving in Winter Weather

THE exhaust manifold of an engine is illustrated as the top pipe or manifold shown in the accompanying figure. It will be noted that a valve is set into this manifold and this valve has a pointer on it which points to C and H.

For summer driving the valve should be set as shown, that is pointing to C, which prevents an undue amount of heat being thrown down around the intake manifold in the chamber shown in the cutaway. Now that winter has arrived be certain to turn this valve so that the pointer points to H, then the heat will be thrown from the exhaust manifold into this jacket, so that the charges of fuel, coming from the carburetor, are impinged upon the walls of the jacket and thus completely vaporized so as to prevent crank case dilution.

The jacket for utilizing the exhaust heat to vaporize the gas is shown here in the cutaway.

Every reader understands that heat is necessary to vaporize gasoline completely. In the summer months, with the temperature from 80 to 90 degrees, little difficulty is encountered. However, in the winter months with a temperature of 32 degrees and below, it is practically impossible to vaporize all of the gasoline without some device similar to that illustrated herewith. However, the mere fact that this device is on the car will do no good unless the owner sees to it that the device is properly set.

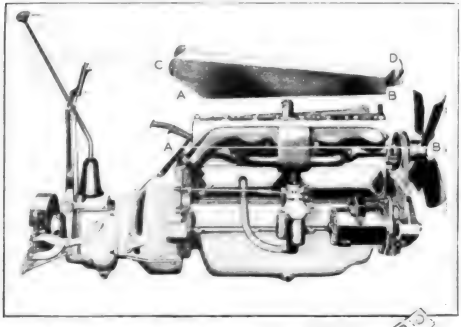
Not all devices have the same type of valve as that illustrated. But if your car is equipped with a manifold heat device your instruction book will show you where it is and tell you how to take care of it. The proper application of heat around the intake manifold will break up the globules of raw gasoline as they strike the hot walls and thus prevent crank case dilution.

How to Hold the Hand Crank

ENGINE starters are so reliable these days that it is seldom necessary to use the hand crank. In the main this is an unfortunate situation and may result in an injury owing to its very infrequency.

In cranking keep the thumb back of the handle so that in case of a back fire the grip releases automatically and it is not likely that the arm will be broken. A tight grip is dangerous in that the hand cannot let go of the crank quickly enough in case of backfire.

An Easy to Make Manifold Heater for Your Automobile



Above is shown how your heater is placed over the exhaust manifold so that the fan will blow air over the manifold and into the opening cut into the dash.

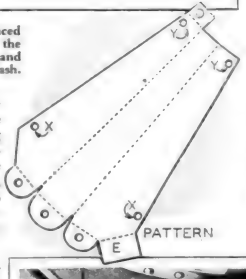
THE car heater of the manifold type is easily made from sheet metal. The first thing necessary is to inspect the engine to see how a heater may be applied to the exhaust manifold, and how it would be possible to arrange the heater so as to cut into the passenger compartment through the dash.

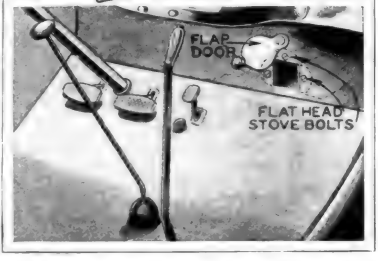
Ordinarily a manifold heater should extend downward to the line shown as AB, on the engine illustrated. Having determined this line and the point at which the dash is to be cut, a piece of paper is used on which to lay out the rough draft of the heater. After the paper has been laid out as suggested in the pattern sketch it should be cut and folded, after which the final fitting may progress so as to have the pattern in approximately the shape shown in the picture at the top. The sheet metal is then laid out from the paper pattern.

It is not necessary that the heater fit real close about the manifold since there must be some room for air to enter. The flap or door, shown at D, is left open until the car heater is actually in use, at which time it may be bent more or less to exclude or admit more air from the fan. This is the only regulation which is provided.

The section E is bent upward to prevent the hot air escaping downward. This is the only part of the lower portion of the heater which is closed.

The heater is fastened to the dash by means of stove bolts, through the flanges, C, which have been bent to extend outward along the dash. Bolts through holes similar to those marked XX and YY, will hold the heater unit to the car manifold.



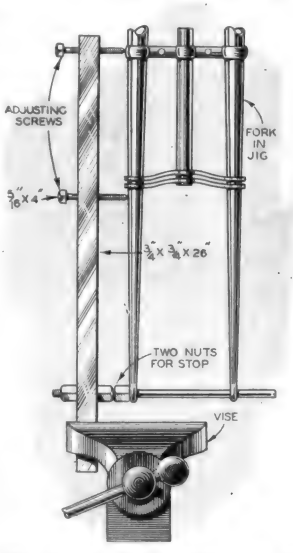


This is how the rear end of your sheet metal heater will be fitted to the back of the dash with a flap to regulate the heat. In the center is shown how the pattern is drawn on paper, after which it is copied off on the sheet metal to be used.

An Easily Constructed Motorcycle Front Fork Gauge

IN STRAIGHTENING motorcycle front forks, a gauge for proving the side alignment will save considerable time. Secure a piece of ¾″ square steel, 26″ long. About 2″ from one end, drill a ⅜″ hole. On the end of a ⅜″ rod, 9″ long, cut a thread for a distance of 2¼″. Screw two nuts on the stud as far as they will go. Place the stud in the square bar, binding it with another nut. Place the front fork on the stud (see sketch) and mark the square bar about ½″ below the crown or lower fork plates and also mark it opposite the triple clamp. Center punch for and drill ¼″ holes and tap them for the 5/16″ set screws, as shown.

To use the gauge, clamp it upright in a vise with the fork in place, as shown. Adjust the set screws to touch the fork side and triple clamp. Reverse the fork and if it is straight, it will again touch both screws. The gauge may also be used with the forks in the motorcycle.



This is how the gauge is used to prove the side alignment of the motorcycle front fork.

The Automatic Thermo Shutter

MANY cars are equipped with automatic shutters and many car owners have the removable winter fronts for their cars.

The principle of operation of the thermostat is a syphon bellows, as shown in the illustration. This brass bellows is filled with a fluid which vaporizes at a point lower than the boiling point of water so that when the heat from the water comes in contact with the bellows, the fluid within it expands, creating pressure sufficient to open and hold open the shutter at the front of the radiator. On cooling, the shutter closes automatically because of the condensing of the fluid in the bellows.

This illustration illustrates how the typical syphon bellows operates the radiator shutter. It is this bellows that needs the most attention.

Winter fronts which have been in storage are especially likely to suffer loss of the fluid from the bellows, in which case the front is inoperative, although to all appearances in good condition.

When signs of overheating are noticed, especially immediately after installing the winter front, the bellows should be suspected for trouble which will be evidenced by failure of the shutter to open.

The same condition may happen at any time with any automatically controlled radiator front.

The repairs are rather simple, insofar as the bellows itself is concerned, although considerable work may be involved in getting to the bellows. The company servicing these will refill them at a nominal charge.

Build a HOUSE that

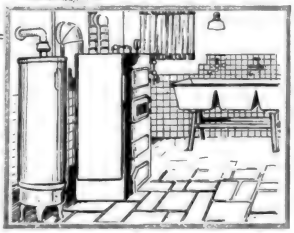
A house that helps pay for itself is a good one to own. That's why modern duplexes made to look like one family houses are becoming increasingly popular with wise investors. They pay an income.

Here is the duplex described in this article.

WHY not make the money you invest in home building bring dollars back to the family pocketbook once a month? Many a duplex owner has found that living in one flat and renting the other not only lessens his own rent, but the income received from rent goes a long way in helping offset the original cost of the house.

In the old days, duplexes were not much to brag about in appearance. In fact, they were so unattractive in many ways as to be regarded as undesirable. Difficult to rent and difficult to sell.

Plan No. 5-D-18.



Reduction from "stylish stouts" to slim flapper lines is the tendency in modern heating plants. Done in colorful enamels they are so decorative and artistic they now help greatly in dressing up basements for playrooms and recreation areas.

Plan No. 5-D-18 of the duplex shown above.

Now, however, architects are so cleverly camouflaging two-family houses to look like single dwellings that the modern duplex has not only taken on new dress and new style, but is looked upon with high regard by wise investors. Like the bungalow's dominance in popularity, the duplex is coming into its own and in some sections of the country is leading the housing parade. There are many sound reasons for it. Here are some.

Suppose you build two bungalows side by side but on two separate lots. You've got two roofs, two basements and two building sites to pay for. But the minute

Pays an Income

by MAURICE I. FLAGG
Director, Small Homes Bureau

HOW TO GET A BLUE-PRINT AND TWO PLAN BOOKS

A one-sheet blueprint of any house appearing in Modern Mechanics magazine may be had for $1.00, postage prepaid. Two new plan books, HOMES FOR NEW-LYWEDS, containing 32 of the latest ideas for low cost homes in all styles, and 16 SELECTED HOMES FOR LEAN PURSES containing time, space, and labor-saving bungalows, may be had for 15 cents each, or both books for 25 cents, postage prepaid. Address Home Building Editor, Modern Mechanics magazine, Minneapolis, Minn., for blueprints and plan books.

Wife-saving kitchens equipped with all the latest time and labor saving machinery are important sales and renting agents for the modern duplex.

Typical bathroom handling in the modern home.

you put one bungalow on top of the other you've saved the cost of one roof, one building site and the extra basement excavation.

In substance the modern small duplex is just one bungalow on top of another. At reasonable additional expense, over and above the cost of building a single bungalow, you extend the side walls upward; duplicate a first floor plan; install a second heater and second bathroom and your duplex is complete. All of which may not be as quickly achieved as it sounds, but if you are income minded and thinking beyond the sentimental values of home building then certainly a two-family dwelling is worth considering.

What kind of a duplex to build? What about style, equipment, demands by renters and possible resale value provided you want to sell and get your money back?

These are questions most home builders want answered in advance of putting a penny into a two-family house which may or may not pay out depending upon how carefully the money is spent and how scientifically the house is designed.

Which brings us quickly to the duplex 5-D-18 selected for this article as an example of a modern two-family house in line with present day trends. It provides the minimum requirements demanded by most renters and in addition has fine resale value.

In the first place the house is planned for an extremely narrow lot of 36 feet. Second; it has been designed with a single entrance and made to appear like a one-family house. The style reflects Italian an-

(Continued on page 190)

"Comet" Plane Navigates Land and Sea But Balks at Air

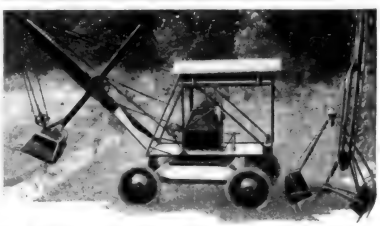
In a recent test, this unique plane, which was designed to navigate land, sea and air, failed to fly, due to a faulty engine. Air sucked in the front of the novel fuselage is thrust out the rear.

IN a recent tryout of the novel type of plane shown at the left, which its inventors, Wendel Wobido and Stephen Nagel, of Berlin, call the "Comet" plane, and which was designed to navigate air, land and sea, navigated land and sea all right, but when it came to going up into the air the darned thing balked and refused to depart from safe old Terra Firma, or rather, in this case, since they tried to take off from the water, good old aqua firma. The plane's reluctance to ascend was caused, the inventors claim, by a faulty engine which went dead.

The chief feature of this novel plane is a cylindrical fuselage, which houses the motor, and through which the air is sucked to be thrust out the rear. This feature, the inventors claim, permits the use of small wings and gives greater stability.

Toy Steam Shovel Operates and Digs Dirt Just Like Its Big Brother

WHAT might be called a super toy—a small edition of a steam shovel that has exactly the same parts and works just as effectively, except on a smaller scale, as its big brother—has been built by a garage proprietor in Birmingham, N. Y., for the purpose of instructing and entertaining his two sons. The ingenious toy can duplicate in its small way any of the actions of the full size shovel; and it is said that grown up men spend considerable time showing the boys just how the thing should be operated.

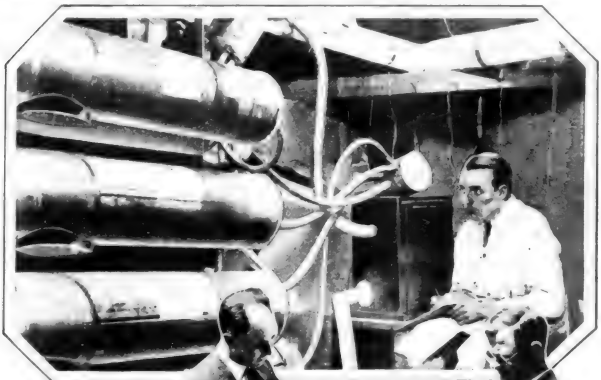


This toy steam shovel, made from old auto parts, and operated like full size model, digs a cubic foot of dirt at a stroke.

Made of various gears and pulleys which were reworked or welded from worn out automobile parts, the machine weighs about three hundred pounds. The cab, which turns on the chassis by the operation of a small hand wheel, is three feet long and twenty inches wide. The boom measures five feet in length, and is constructed of steel plates, reinforced on the edges with riveted angle irons. The shovel itself holds nearly a cubic foot of earth, having the regulation dump trap and geared stick. There is also a clam digger attachment with a separate boom.

Motive power for this toy is furnished by easily turned cranks, while regulation brakes and levers direct the various movements.

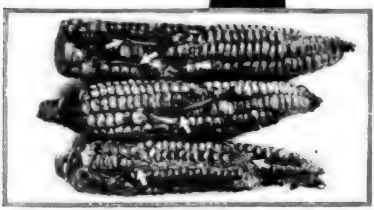
Scientists Study Corn Borer Habits With "Olfactometer"



In the olfactometer, shown above, the habits of the corn borer are studied.

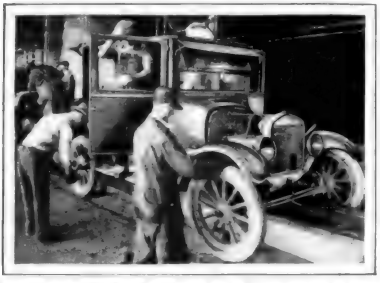
Borers which are to be studied are kept isolated in the glass vials.

A CURIOUS machine called an "olfactometer" has been developed by government entomologists at the Department of Agriculture corn borer laboratory in Arlington, Mass., as an aid in the campaign for eradication of this insect, which has already cost the country many millions of dollars. This olfactometer is used to determine what odors attract the moth of the European corn borer to corn and other farm crops. It has been proven that the moth is attracted by the odors emanating from these fields, since it flies only at night, and cannot, of course, otherwise distinguish these plants. The machine shown in the photo at the top of the page consists of a series of galvanized iron pipes in which conditions are made to duplicate the ideal conditions for the activities of the moth, so that traps can be devised for the destruction of the pest.



This photo shows some corn borers at work feeding on ears of corn which they have almost totally destroyed.

Antiquated Ford Autos Salvaged for Usable Materials



The derelict Ford cars are placed on the conveyer, and stripped of all parts, which are then made over into other products.

OBSOLETE Ford automobiles that in former days rattled jauntily up and down the highways and byways of the country are not being consigned to the ignominious oblivion of the junk-heap; instead Henry is gathering in all his antiquated brain-children and salvaging the worn parts for the usable material in them. Derelicts are taken from Ford dealers, who have bought them up at a fixed price of $20 each, and are shipped to the Ford junking plant in Dearborn, where they are placed on a conveyer which carries them through the various breaking down processes.

The cars are first drained of oil, gasoline, and grease. Next they are stripped of tires, headlights, batteries, spark plugs, rims, horns, wires, etc., all of which parts are melted up, cast over, and used in some other form for some other purpose.

Workmen Wear Spats for Safety

ADVICE to workingmen, at least in some occupations, to wear at work those supposedly aristocratic articles, a pair of spats, is given by experts of the National Safety Council in a recent issue of their periodical leaflet, called "The Safe Worker." Men working in hazardous occupations or situations usually protect their eyes, hands and their bodies generally, the announcement says, but frequently forget to protect their feet. Foot injuries are responsible, it is said, for a generous proportion of painful industrial accidents, if not of fatal ones. Foot protection may take the form of shields, heavy overshoes, heavier soles or spats, depending on the nature of the danger. Spats are especially recommended for occupations or locations in which sparks or droplets of hot metal may fly about and strike the shoe or the foot. Factory shoes with reinforced toe-caps, like the copper-toed shoes sometimes worn by farm boys two generations ago, have been developed, the Council's experts state, and are recommended for occupations in which toes are likely to be stepped on or in places where heavy articles may fall on toes and injure them. These shoes are described as "neat and dressy" as well as practical, but undoubtedly the one of the Council's recommendations which will appeal most strongly to professional advisers on what the well dressed mechanic ought to wear is the one of working in a pair of reinforced spats.

Plane Trails Flags in Ad Stunt

In this novel ad stunt, flags spelling out the advertiser's name are trailed from the airplane.

A New Thrill at every turn

MOTORCYCLING is one sport you never tire of. New thrills — new adventures — await you at every bend in the road. Every mile has a joy of its own. Every trip brings a new pride in the eager power — the effortless speed — the easy handling—of your Harley-Davidson.

One ride astride a 1931 Twin will make you an enthusiast. No more cooped-up cars for you! Only the freedom and road-mastery of the motorcycle — a Harley-Davidson — will satisfy you. And how *little* it costs!

Let your local Harley-Davidson Dealer show you the 1931 Twins and Single — and tell you about his Pay-As-You-Ride Plan. Go see him today!

Mail the Coupon for new literature illustrating the wonderful 1931 models.

HARLEY-DAVIDSON
Motorcycles

MAIL THIS COUPON

HARLEY-DAVIDSON MOTOR COMPANY
Dept. M.M., Milwaukee, Wis.
Interested in your motorcycles. Send literature.

Name .....

Address .....

My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check your age group.

Chinese MAGIC

Magic

Learn at Home, By Mail!

Easily! Quickly!

Astonish Your Friends

NOW!—*if you act quick!*—you can learn *magic*, real professional magic, direct from the world-famous magic wizard, Dr. Harlan Tarbell, the man who has trained many of our most prominent magicians. He has developed a *new* simple course, that enables any man or woman who can read or write to *learn magic*—easily and quickly, at home, by mail. Why envy others? Make them envy YOU! *Learn magic!*

Write! Mail coupon now for the free Magic circular telling all about the great Tarbell Course in Magic.

Learn how EASY it is going to be for you to LEARN REAL MAGIC!

Tarbell System, Inc., Studio 23-59
1926 Sunnyside Ave., Chicago, Ill.

Tarbell System, Inc., Studio 23-59
1926 Sunnyside Avenue, Chicago, Ill.

Gentlemen: Without any obligation send me your free literature and information all about your wonderful "Tarbell Course in Magic." Also tell me about your Low Price Offer and Easy Payment Plan.

Name .....

Address .....

..... *Age*.....

Modern Card Sharps' Methods

(Continued from page 64)

hand, the bugaboo is sure to be the individual who looks like easy picking and to all outward appearances makes the perfect simpleton and sucker. That's one for whom you'd better watch out—because, explained my informant, who is a detective in charge of overseas crooks on a fleet of liners, they're never as dumb as they look.

The dominie-gentleman did not wait for an answer when he asked if he could get into a game, but strode to the bar and ordered a whiskey and soda, depositing a hundred dollar note on the bar which he had peeled from a bundle of bills which were about as big as a cabbage. The card gyppers' eyes widened. They were filled with glee. The altar was swept off clean for the sacrifice.

In another minute he was seated to a four-handed game of poker. He was quick to grasp the tactics of this trio. The dealing was square, there were no trick appliances, and the cards weren't marked. What's more they let him take the first two pots. Amateur stuff, but they seemed bent on big stakes, he figured. No doubt they were primed to clean him to the bone.

Finally, the dealer and one of his confederates dropped out. This bit of strategy was not unknown to our hero, apparently. The closing contest was left to the confederate who had raised the stakes. The stranger knew that the dealer was his opponent's ally.

The sharper and the stranger looked into each other's eyes intently as they made their requests of the dealer for cards. The shark seemed a little flushed. The preacher-man was as cool as if he was attending Easter Sunday mass. But he was constantly on his guard, ever-watchful for the sly second and crucial moment when the dealer would slip a card to his opponent.

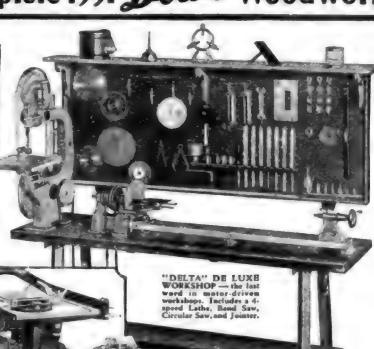
All of a sudden the stranger seized the shark by the wrist and insisted, "Show your hand as it is! Here are my cards. Four kings and a ten take this pot."

With lightning speed he forced five weak cards from his adversary's hand. Before his associates were aware of what had transpired, the would-be reverend grabbed the pot, which was $100,000 flat, and was on his feet.

(Continued on page 168)

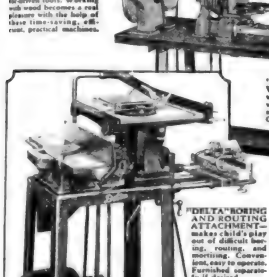
New Units, *New* Features, *New* Improvements in Complete 1931 "*Delta*" Woodworking Line

No more drudgery — no more tedious hand work when you use "Delta" motor-driven tools. Working with wood becomes a real pleasure with the help of these time-saving, efficient, practical machines.



"DELTA" DE LUXE WORKSHOP — the last word in motor-driven workshops. Includes a 4-speed Lathe, Band Saw, Circular Saw, and Jointer.

"DELTA" BAND SAW has many exclusive features. Provided with special extra-safe guard. Furnished with or without stand.



"DELTA" BORING AND ROUTING ATTACHMENT — makes child's play out of difficult boring, routing, and mortising. Convenient, easy to operate. Furnished separately if desired.

Practical Motor-Driven Woodworking Equipment Now Within Reach of All

Again "Delta" blazes the trail toward woodworking efficiency with the announcement of its new 1931 line! Now are available at astonishingly low price levels a complete series of compact, rugged woodworking machines incorporating numerous exclusive constructional features. Each unit embodies the practical, efficient design, the careful workmanship, the dependable quality of materials — for which the "Delta" trademark stands. The new "Delta" Boring and Routing Machine, the "De Luxe" Workshop, the new "Delta" Band Saw, as well as the improved "Handi-Shop" are but a few of the Delta Units that will be of intense interest to all those who work with wood. All units now operate with either electric or gasoline motor power.

"DELTA" COMBINATION JOINTER and CIRCULAR SAW. Can be operated separately or together — no interference. Furnished with or without motor.

Make Things Quickly and Easily With These Modern Motor-Driven Tools

They save time and labor, and produce better work for artisans, farmers and mechanics. Up-to-date craftsmen everywhere are flocking to motor-driven woodworking equipment to eliminate tedious hand labor. And for full or spare-time work, "Delta" Units quickly pay for themselves.

"DELTA" HANDI-SHOP — A complete, compact, practical motor-driven workshop. Popularly priced. Includes equipment for wood-turning, circular-sawing, scroll-sawing, boring, sanding, grinding and buffing

"DELTA" LINE-SHAFT SHOP

Includes 4-speed Lathe, Band Saw, Jointer and Circular Saw. Operates with either gasoline or electric motor. Very efficient.

10-Day Trial EASY TERMS

Send coupon today for free illustrated literature describing the new 1931 "Delta" line. Also details of 10-Day Trial Offer and Easy Payment Plan.

DELTA SPECIALTY COMPANY
Division of DELTA MFG. CO.
1661-67 Holton Street Dept. M1230
MILWAUKEE, WISCONSIN

Delta Specialty Co., 1661-7 Holton Street
Milwaukee, Wis., Dept. M1230

Gentlemen: Please send me FREE illustrated literature describing 1931 "Delta" line and details of 10-day Trial Offer and Easy Payment Plan. (Check items of particular interest.)

- ☐ "De Luxe" Shop
- ☐ Handi-Shop
- ☐ Band Saw
- ☐ Line-Shaft Shop
- ☐ Boring Machine
- ☐ Jointer
- ☐ Circular Saw
- ☐ Moulding Cutter

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Address .....

..... Age .....

Develop EVERY muscle with this great outfit. All yours for only $5.00. Includes 10-cable Progressive Exerciser and Chest Expander; Wall Pulley Attachment; Stirrup for leg muscles; two Scissor Grips for developing wrists, hands, arms; patented adjustable Head Gear for building powerful neck; Rowing Machine Attachment; 12 weeks Home Instruction Course in Scientific Body Building and FREE Encyclopedia of Health and Strength.

Send No Money! Just mail coupon TODAY for this wonderful bargain.

GUARANTEE

You don't risk a cent. Try Outfit 10 days. Money back if you want it. Don't miss this chance! Mail coupon NOW.

Michael McFadden
Dept. W-12. 55 East 11th St.,
New York, N. Y.

FREE *Encyclopedia of Health and Strength if you mail coupon at once.*

Michael McFadden, Dept. W-12,
55 East 11th St., New York, N. Y.

Send me ON TRIAL, complete 8-in-1 Outfit as described. I will pay postman only $5.00 plus actual postage on arrival, (or enclose $5.00 and we pay postage). My money back if I return outfit in 10 days.

Name .....

Address .....

Town ..... State .....

Outside U. S. send cash with order

Modern Card Sharps' Methods

(Continued from page 166)

"One word or one move from any of you," he challenged, "and I'll see that you all go to jail not only for this but for past offenses—and you all know what that means." He bowed suavely and departed.

The man whom he had saved from suicide was waiting for him at his cabin. The stranger could see the dents in his lips where he had been biting them from nervousness.

The benefactor kept his word. He gave the man back his $25,000 on a promise that he would confine his card activities to the people upstairs and not run into a similar trap again.

"That ecclesiastical-looking gent," explained the ocean liner's detective, "was at one time a fearless card sharp. He went in for diamond smuggling, too. But he was retired for some years before the occurrence of this latest escapade. We never actually had anything on him. He was one of the smartest in the business. He knew all the tricks and combinations from A to Z."

Now for a further insight into the tricks and wisdom of card cheaters aside from the sleight of hand and mechanical card-tricks, which will be explained further, it will be interesting to note that mathematicians have computed that a full deck of fifty-two cards contains 2,598,960 possible combinations for 5-card hands. One-half of these have absolutely no poker value.

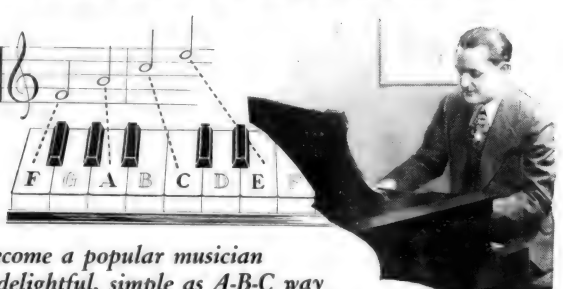
Furthermore, out of those 2,598,960 different hands, there are only 40 straight flushes possible of which four are the royal flushes. On the other hand, 624 sets of fours may be formed and you can derive 3,744 full houses and there are 5,100 ways in which you can compose flushes, 10,200 for straights, 54,912 combinations of three's, 123,500 hands containing two pairs and 1,100,000 hands with single pairs.

Here is the way readers, or marked cards, are made. A piece of wax or resinous substance is used to make a streak across the back of a card. This becomes very visible when held against a strong light. The curve of the streak may further identify the card.

India ink, which has been secreted within the groove of the finger-nail will enable one to mark certain cards while playing. Cards which are accessible before sitting down to

(Continued on page 170)

Just as EASY as it looks



to become a popular musician this delightful, simple as A-B-C way

STOP cheating yourself out of musical good times. Stop thinking that learning music is nothing but one grinding session of monotonous exercises and harsh-sounding scales after another . . . days, months and years of difficult technique and dry-as-dust theory under the thumb of a private teacher.

Don't let others talk you into believing any such thing. It's ridiculous—absolutely! And we've already proved it to the complete satisfaction of over 600,000 enthusiastic students who have learned to play their favorite instrument right at home—without a teacher.

You're Never in Hot Water

Take a look at the above diagram. Looks easy, doesn't it? Well, it's every bit as simple as it looks. First a note . . . then a letter. Plenty of clear instructions *tell* you how each bar is played—lots of diagram pictures *show* you how, then you do it yourself and *hear* it. Everything to make learning a joy. Nothing to make you lose patience. No headaches. In fact, the U. S. School of Music has made the reading and playing of music so downright simple that you don't have to know one note from another to begin.

Play Real Tunes From the Start

Your first thrill comes with your very first lesson. For you are given a piece with a real melody to play by *actual notes*. Dreamy waltzes, heart-throbbing ballads, stirring marches, sparkling sonatas, rediffil etudes follow in short order. No standing still. Progress is rapid. In this way, you become a capable performer months sooner than you could ever expect to the old-fashioned way. Yet, no matter what instrument you select, the cost of learning is the same—just an average cost of only a few cents a day.

Not only that, you receive all the music you need *at no extra cost*. With every lesson comes a specially selected and graded piece, which is yours to keep, enjoy and play to your heart's content.

Play the "Blues" Away

How can you be content to sit around at party after party and listen to others do all the playing—hear them receive all the compliments—see them showered with admiration, attention, invitations—when your lifelong ambition to become a regular musician is now so easy to realize. Get in the musical "swim" yourself. Watch the singing, happy crowds gather around you as you play the latest syncopation. Experience the personal satisfaction that comes from being able to play "when," "where" and "what" you like for your own amusement and the entertainment of others.

Don't be afraid to begin your lessons at once. Over 600,000 people learned to play this modern way—and found it as easy as A-B-C. Forget that old-fashioned idea that you need special "talent." Just read the list of instruments in the panel, decide which one you want to play, and the U. S. School will do the rest. And bear in mind, no matter which instrument you choose, the cost in each case will average the same—just a few cents a day. No matter whether you are a mere beginner or already a good performer, you will be interested in learning about this new and wonderful method.

PICK YOUR INSTRUMENT	
Piano	Violin
Organ	Clarinet
Ukulele	Flute
Cornet	Saxophone
Trombone	Harp
Piccolo	Mandolin
Guitar	Cello
Hawaiian Steel Guitar	
Sight Singing	
Piano Accordion	
Italian and German Accordion	
Voice and Speech Culture	
Harmony and Composition	
Drums and Traps	
Automatic Finger Control	
Banjo (Plectrum, 5-String or Tenor)	
Juniors' Piano Course	

Send for Our Free Book and Demonstration Lesson

Our wonderful illustrated Free Book and our Free Demonstration Lesson explain all about this remarkable method. They prove just how anyone can learn to play his favorite instrument *by note* in almost no time and for just a fraction of what old, slow methods cost. The booklet will also tell you all about the amazing new *Automatic Finger Control*.

Read the list of instruments to the left, decide which you want to play, and the U. S. School of Music will do the rest. Act NOW. Clip and mail this coupon today, and the fascinating Free Book and Free Demonstration Lesson will be sent to you at once. No obligation. Instruments supplied when needed, cash or credit. U. S. School of Music, 26212 Brunswick Bldg., New York City.

U. S. SCHOOL OF MUSIC
26212 Brunswick Bldg., New York City

Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane, Free Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course:

Have you
Instrument?. . .

Name . . . . . .

Address . . . . . .

City . . . . . State. . . . . .

I'll soon be making Big money
. . . may become a national radio favorite
Good bye overalls
No more dirty work
and popular! Oh Boy!
Gee! I like getting paid for having fun

What's the Matter with You?

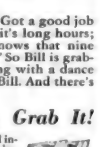
Why Don't YOU Get Set Now for One of Those Soft, Sweet Jobs?

BILL, here, is making good wages. Got a good job in the mill. Steady work too. But it's long hours; hard work; a grind. And Bill knows that nine chances to ten it's a "life sentence." So Bill is grabbing the only sure way out. Playing with a dance Band — Big Pay — looks good to Bill. And there's a chance for fame and fortune.

This Is Your Hunch. Grab It!

Why don't you step out of the overalls and into a "white collar" job? You don't have to be talented. Learn any instrument in a few weeks' spare-time practice. Double your income, treble your social position. Make big money — big friends.

Mail coupon below for catalog of your favorite instrument, saxophone, trumpet, trombone, clarinet; then take an instrument home on six days' free trial. Test yourself before you buy. See what you can do. No obligation. Mail coupon NOW.



BUESCHER

BUESCHER BAND INSTRUMENT COMPANY
1215 Buescher Block, Elkhart, Indiana. Buf

Gentlemen: Without obligating me in any way, please send complete catalog of (check which) trumpets ☐ trombones ☐ saxophones ☐ clarinets ☐. Mention any other

Name .....
Address .....
Town ..... State .....

Modern Card Sharps' Methods

(Continued from page 168)

a game may be easily marked by ordinary pen and ink or crayon.

Many a crooked card game is won right at the start, beginning with the dealing. Concealed instruments of sand, glass or acid may be used to mark the cards while playing, so that when it comes to the dealing again, the highly-sensitive fingers of the sharp can discern from the nature of the rough part on the back of the card made by the scratching just what kind of a card it is. The clever dealer withholds that particular card for his partner, slipping another one in to his opponent in its stead, as shown in accompanying drawings.

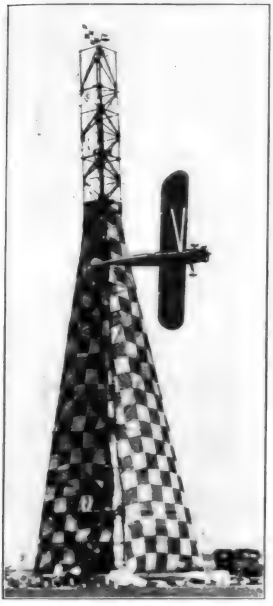
The polished surface of a cigarette case or a little concave mirror attached to a pipe which reposes on a table may be used to reflect the other side's hand. Or a similar mirror may be attached to a match box. Or, still again, a mirror that is very tiny may be tacked onto the table itself. In former days when the snuffbox was popular, the mirror trick was first used on it.

Dealing with a stack of cards which has been marked is easy work for the sharp card practitioner. For a wizard of this type it is very easy for him, on the theory that the hand is quicker than the eye, to slip out a card from the bottom to his partner or to deal a card which is second from the top and worthless to his opponent.

The so-called hold-out is one of the simplest tools of the card thief. One of the crudest means is to conceal the card in the palm of the hand, inserting it into play at the ripe moment. One hold-out machine which is very much in use today has netted the inventors a rich harvest. This consists of a leather band fastened around the arm near the elbow, beneath the coat sleeve as illustrated in accompanying drawings. To this is attached a spring, pressure upon which works a rod running along the arm which connects with a plate.

The cards which are held out have been placed beneath the plate which in turn keeps them in position. When it behooves the player to draw from his reserve cards, he merely presses his arm against his body, thus setting the spring in operation. The spring works the little rod which throws forward the concealed cards from behind the plate.

HEATH WINS AGAIN!



Actual photograph showing the champion Heath Parasol rounding the Pylon far ahead of the field.

at the 1930 National Air Races

The Heath Parasol has done it again. For the fifth consecutive year America's most popular sport plane has defeated the best light planes in America—flown under identically equal conditions, at the 1930 National Air Races.

Such a record inspires confidence. People have faith in a plane that backs up its claims with such uninterrupted superiority. And this leadership is evident not only at the races but throughout the airways of America as well.

Enthusiastic owners know that the Heath Parasol is the easiest ship to fly ever built. It is off the ground in 4 seconds and at the end of the field is higher than any plane ever created. From spinner to skid it is built for safety and endurance.

Its low upkeep cost is without equal. Consider that it flies 40 miles on a gallon of gasoline. Observe that it requires no airport for its landing—and no hangar for its storage. Then you'll understand why it can be flown for less than 1 cent a mile!

Build It For $199

As hundreds have already done—you can build the Heath Parasol from clear easy plans in a remarkably short time for only $199. Parts are shipped in 11 convenient, progressive groups. $12 brings the first shipment. Or if you prefer—you can buy it complete ready to fly away for $975. Let us tell you more about America's most popular sport plane. Without obligation mail the coupon below.

HEATH
AIRCRAFT CORP. CHICAGO

Heath Aircraft Corp., Dept. M. 12
1721-9 Sedgwick St., Chicago, Illinois.

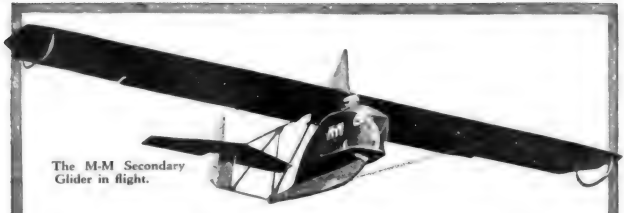
Enclosed find 10 cents for postage. Without obligation—please send me your large illustrated booklet. I am particularly interested in:

The complete Parasol—ready to fly at $975
Building the Parasol for $199

Name

Address

City State



The M-M Secondary Glider in flight.

BUILD *this* GLIDER

The M-M Secondary Glider was designed especially for readers of the Flying and Glider Manual by Orville Hickman. It's a semi-soaring glider which will stay aloft two or three times as long as the primary type, and it is of such sturdy construction that it is an ideal ship for the beginner. Complete plans for building this remarkable glider, together with photographs of the completed ship and numerous working drawings, appear in the NEW 1931 Edition of the

FLYING and GLIDER MANUAL

This is just one of hundreds of features in this great "how to build it" handbook of aviation. Here are a few of the high spots:

LIGHT AIRPLANES—Plans for the Anzani Longster, the Driggs Dart, and the Georgias Special, three popular light monoplanes of proved design. Also the Church Mid-Wing Conversion plans for the Heath Parasol, and plans for the Heath Seaplane and its Pontoons.

GLIDERS—Plans for a secondary glider, obtainable nowhere else. Experiences of glider builders, pointers on how to fly them, some notes on power gliders.

ENGINE CONVERSIONS—How to convert a Smith Motor Wheel into an aircraft engine, ideal for a power glider—also the conversion of the Lawrence two-cylinder opposed motor for lightplane use.

FLYING LESSONS—by Gene Shank, Ed Heath, and other famous pilots. Also scores of miscellaneous features of practical value to pilots. Plans for a flying model of the Bowlus glider—plans for a model plane that drops a parachute in flight. Get your copy Now!

Now On Sale!

PRICE 50 CENTS at all NEWS-STANDS

If your newsdealer is sold out, send 50 cents to Fawcett Publications, Inc., 529 S. Seventh St., Minneapolis, Minn., and a copy of the 1931 Flying and Glider Manual will be sent to you at once.

Balloonist Seeks 10-Mile Height

(Continued from page 49)

Capt. Gray succeeded in rising well above all previous marks but his 60,000 cubic foot balloon, which had been filled to capacity at the take-off, retained so little gas when it started down, and all available ballast being exhausted, began to pick up such speed, that Gray was forced to jump to save his life.

On his next attempt he equipped everything loose save his recording instruments with parachutes and as the descent began, checked it by casting overboard his oxygen cylinders, his radio, radio battery, loud speaker, heater battery for his goggles and gloves, and finally a wooden frame work which had supported his sand ballast bags on the outside of the balloon basket.

On his third, and final flight, the one that cost his life, he had made the same arrangements, but, probably due to the stopping of his watch when oil in its works froze, he miscalculated his time and died of oxygen exhaustion at about 42,000 feet.

At that height he had about reached the extreme limit to which a person can go while exposed to the decreased air pressure. A few thousand feet higher, possibly just above 45,000 feet, the air becomes so light that the body would suffer a sort of minor explosion, gases in the blood being released to cause death.

To fix that absolute height to which a living being can go two army flyers, Captain Kepner, famous balloonist, and Captain Stevens, noted photographer, have for some time been planning a flight to 45,000 feet. The army has refused to authorize any more balloon flights to high altitudes, and so the trip is being planned as a private scientific venture. If the funds can be secured and the experiment made it will be the first two-man flight to high altitudes in an open balloon basket. Captains Kepner and Stevens had planned, if successful, to replace the basket with an air tight car and attempt another flight to the 50,000 mark.

All sorts of unexpected problems enter into high flights in balloons. Captain Gray's high speed descent in his first trip was partly due to the escape valve in the top of the balloon sticking and remaining partly open when he "cracked" it at the ceiling to release a small amount of gas and start his descent. The valve, eighteen inches in

(Continued on page 174)

This is FIGHTING *Talk*

IF YOU'RE a quitter you won't read far in this advertisement. If you're not—if you have the courage to face facts—you want to know who is responsible for your not getting ahead faster. It's YOU. The man who won't be licked *can't* be licked. If you're a drifter you'll always wish for success but never do anything about it. The earth is cluttered with that kind.

If you're a fighter you *will* do something about it. You'll get the special training that fits you for advancement, and you'll go on to a bigger job.

In spare time, right at home, you can get the training you need through the home-study courses of the International Correspondence Schools. Thousands of other men have lifted themselves out of the rut and into well-paid, responsible positions by I. C. S. study. Are they better men than you?

The time for action is *this minute*. Find out about this practical educational method that lets you learn while you earn. Check the subjects that interest you in the coupon below and mail it today. It doesn't obligate you in any way to ask for full particulars, but that one simple act may make all the difference between failure and success. *Do it now!*

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 2318-M, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject before which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Mechanic
☐ Architectural Draftsman	☐ Plumbing ☐ Steam Fitting
☐ Building Estimating	☐ Heating ☐ Ventilation
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☐ Structural Draftsman	☐ Steam Electric Engineer
☐ Structural Engineer	☐ Civil Engineer
☐ Electric Wiring	☐ Surveying and Mapping
☐ Electrical Engineer	☐ Refrigeration
☐ Electric Lighting	☐ R. R. Locomotives
☐ Welding, Electric and Gas	☐ R. R. Section Foreman
☐ Reading Shop Blueprints	☐ R. R. Bridge and Building Foreman
☐ Telegraph Engineer	☐ Air Brakes ☐ Train Operation
☐ Telephone Work	☐ Highway Engineering
☐ Mechanical Engineer	☐ Chemistry ☐ Pharmacy
☐ Mechanical Draftsman	☐ Coal Mining Engineer
☐ Machinist ☐ Toolmaker	☐ Navigation ☐ Boilermaker
☐ Patternmaker	☐ Textile Overseer or Supt.
☐ Pipefitter ☐ Tinsmith	☐ Cotton Manufacturing
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Balloonist Seeks 10-Mile Height

(Continued from page 173)

diameter, is held closed by rubber cords. In tests later Captain Stevens discovered that rubber ceased to be elastic at the extreme cold of the upper air, and if you stretch it it remains stretched until it is warmed again.

To offset that trouble he and Captain Kepner plan to use steel springs to close the valve, and also plan to install a much smaller valve which can be used to release the small amount of gas which must be valved to start the descent. Then if the small valve fails to close perfectly, the amount of gas which may be lost will be much less than the leakage of the bigger valve.

Professor Piccard's idea of using an extraordinarily large gas bag, only partly filled at the take-off, may offset much of the trouble in the descent. His idea of starting with only a partly filled bag and counting on expansion to give the increased lift in each successive layer of lighter air, however, is questioned by experienced aeronauts. They would prefer to fill the bag to capacity, load with an enormous supply of ballast, drop such ballast as was necessary to ascend, and still have ballast left to check the descent as they neared the ground again.

Operating from a closed car adds some problems to ballooning, but offers an ideal way for handling ballast. Ordinarily the sand is carried in small bags of about 25 pounds capacity and a bag is opened and handfuls cast over the side as needed.

Captain Gray found at high altitudes he became so weak he could not lift the bags, and, in fact, he fainted on one trip and remained unconscious for a considerable time while the balloon bounced along its ceiling, until eventually it lost sufficient gas to start down.

Thereafter he used a ballast bag of his own invention, copied from the familiar parachute release arrangement. A flap at the bottom of a long balloon cloth tube was held closed by a grommet and eye, with a wire passed through the eye. The bags were hung outside the balloon basket on a wooden frame, and cords from all the eyes led to a panel board, where they terminated in wooden knobs. To release a bag of sand he had only to pull a knob.

(Continued on page 176)

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Balloonist Seeks 10-Mile Height

(Continued from page 174)

Captains Stevens and Kepner planned to carry ballast in the bottom of their car, if they attempted the 50,000-foot flight, with a single release valve through which the ballast, in the form of fine bird shot could be released.

Only one closed car ascent has ever been attempted in this country, and that was in an airplane at McCook Field, Dayton. The pilot of the plane entered through a manhole, which was closed from the inside, so the air pressure within would help hold it tight against the wall and prevent leakage. Unfortunately something went wrong with the oxygen apparatus and the pilot began to pass out from lack of fresh air. He attempted to open the manhole, but the air pressure outside, at 20,000 feet above the ground, was so light that the pressure within held the door fast. In desperation he dived for the field and finally succeeded in making a safe landing just before he became unconscious.

Harnessing the Power of the Sun

(Continued from page 47)

Owen D. Young, the chairman of the board of the General Electric company, and author of the Young plan for the settlement of Germany's war debts, has suggested that it would pay capital to sink a ten mile shaft into the earth merely to find out what may be there. Power probably would be the only product, for even if minerals were found no miners could stand the heat and work the veins.

The idea of a ten mile deep shaft is not as fantastic as it might seem. In California oil well drillers are flirting with the two-mile mark, and as drilling tools improve and experience in their operation at such great depths increases it is probable that much deeper shafts may be sunk.

Wave motors, always an intriguing subject with inventors, continue to be built, though no one has yet succeeded in capturing a steady and reliable source of power from the waves of the sea. Untold millions of horsepower are available on any coast for the inventor who solves the problem of harnessing them.

Indirectly, the power of the waves and

tides may be trapped, and Maine has under consideration an ambitious scheme to do just that. Twice a day the tides rush up a long arm of the sea that steadily narrows toward the land end, with the result that the tremendous bulk of water crowding in the wide mouth is piled up into tides that at some periods of the year reach forty feet or more in depth. It is planned to build a dam across the bay, connecting various islands with the shore. At each incoming tide the gates would be opened to admit the water, and then closed to hold it while the tide recedes, giving millions of acre feet of stored water, with a fairly large head, to be carried down to the power house turbines.

The scheme has had one stumbling block, a state law against the export of Maine generated water power to other states, and as long as that law exists the state does not offer a sufficient market for the enormous power which could be generated from the sea. On the Maine-New Brunswick border the Bay of Fundy offers even greater tidal bores, while south of the Imperial Valley on the California-Mexico border, there is a similar great tidal bore at the mouth of the Colorado river, where the incoming tides sweep up the Gulf of California and spill out over the marsh lands.

With all the schemes for power from new sources, much remains to be done in utilizing the already known fields. Improvement in electrical transmission and extension of super-power networks to form inter-connection between power plants throughout the country may some day soon lead to burning coal at the mines, instead of hauling it hundreds of miles to market.

Leaders in the electrical power industry confidently expect that some day the coal will not even be hauled to the surface, but will be burned in power houses situated on the lower levels of the mines, where the coal can be fed direct to the boilers by gravity. The Pennsylvania anthracite fields may some day export their power over wires to New York and New England; the West Virginia mines may be wired to the Pittsburgh steel mills, and the soft coal veins of Southern Illinois and southwestern Indiana may house superpower plants to run Chicago, already the largest per capita consumer of electrical energy in the world.

The only problem in burning the fuel at the mines is one of obtaining boiler water

(Continued on page 179)

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Harnessing the Power of the Sun

(Continued from page 177)

in sufficient quantities. For every ton of coal burned an enormous quantity of water is turned into steam, and water supplies rather than fuel always dictate the location of a steam power plant.

For several years the problem of transmitting electrical energy by radio instead of by wire has intrigued inventors as well as the public. That it will ever be realized on a commercial scale is hardly possible, but C. Francis Jenkins, the famous motion picture, radio and television inventor had a tiny radio motor running as long ago as 1926. The motor was almost microscopic in size, but it did pick up the carrier wave of a local broadcasting station and turn at a merry rate.

Aside from sun, wave and thermal power, and the latent heat stored in the interior of the earth, there are new fuels to be utilized. Corn stalks and other farm waste may be turned into fuel, and fuel alcohol extracted on a large scale from wood waste, potatoes, and other crops. If the gasoline supply ever does fail, as has been so many times predicted, it is a fairly safe bet that science will be ready to step into the breach with an efficient substitute. And, if science fails, there's always electricity to fall back on. Some day we may all be driving electrical cars charged from the successors of Dr. Claude's thermal power plant.

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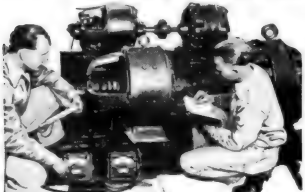

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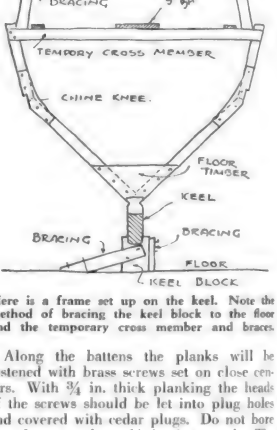
Plans for "Waterwitch"

(Continued from page 142)

FIGURE 7



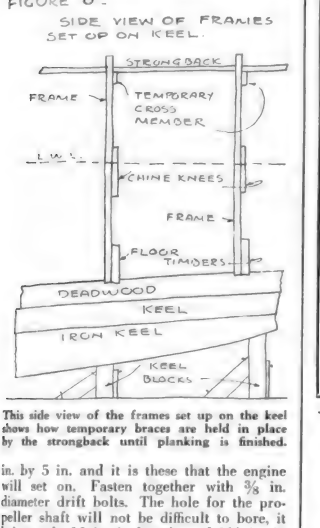
Here is a frame set up on the keel. Note the method of bracing the keel block to the floor and the temporary cross member and braces.

Along the battens the planks will be fastened with brass screws set on close centers. With ¾ in. thick planking the heads of the screws should be let into plug holes and covered with cedar plugs. Do not bore the plugs too deep. ¼ in. is enough. The plugs will be set in white paint or varnish. do not put them in bare.

The mast step will be made from a piece of 2 in. by 8 in. white oak and should extend over two or three floor timbers as shown in the construction plan. Fasten the step to the floor timbers with ⅜ in. diameter galvanized iron drift bolts; two to each floor timber. The cabin flooring will be ⅞ in. fir, and lays directly on the floor timbers.

Take my advice and get the engine beds in and the engine in before the deck is laid. I would also suggest piping up the exhaust line at this stage of the construction when it can all be gotten at easily. You will need two extra high floor timbers for part of the engine bed; these being on frame 7 and 6 in.. abaft frame 6. Fasten well to the planking and the frames. Fore and aft over these will be two pieces of white oak 2½

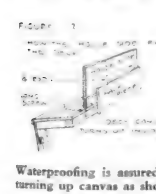
Plans for "Waterwitch"



This side view of the frames set up on the keel shows how temporary braces are held in place by the strongback until planking is finished.

in. by 5 in. and it is these that the engine will set on. Fasten together with ⅜ in. diameter drift bolts. The hole for the propeller shaft will not be difficult to bore, it being only 12 in. in length, and 1⅛ in. in diameter. Bore it through with a ship auger.

The clamp will be made from ⅞ by 3 in. yellow pine or fir and must be in a single length. It will be fastened to the heads of the frames with ½ in. bolts. The shelf lays over this. This will also be made from yellow pine or fir, but must be cut to the shape of the deck line and will therefore have to be made in at least two pieces. A long scarph or joint will come at about Station 4. The shaft for the shelf will be gotten from the lay-



Waterproofing is assured by turning up canvas as shown.

(Continued on page 182)

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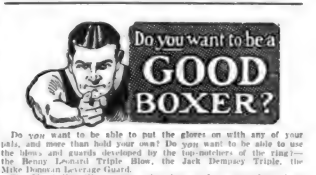

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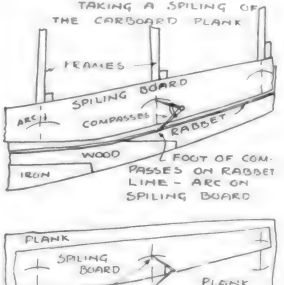
Plans for "Waterwitch"

(Continued from page 181)

FIGURE 10 -



Here's how the basswood spiling board is used as a template in shaping the garboard or bottom plank to the rabbet. Fitting is then easy.

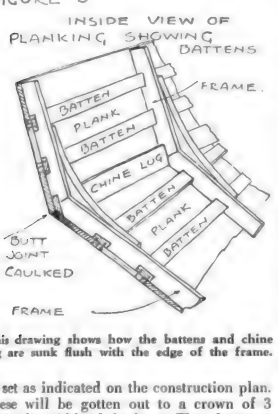
ing down plan. If this is made the same curve as the edge of the deck it will fit close enough when dropped down the depth of the deck beams, which are only 2 in. The shelf must be through bolted to the frame heads and also to the clamp. This part of the construction has to be strong for otherwise you will have the deck coming adrift from the hull the first time you get caught out in bad weather. The forward ends of the clamp and shelf will be fastened together and to the stem as well with an oak knee. And in each corner of the stern a knee will tie the construction together.

FIGURE 13

Shape and dimensions of rudder are shown here.

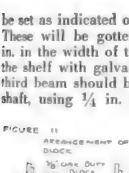
The deck beams will be made from 1½ in. by 2 in. white oak and will

Plans for "Waterwitch"



This drawing shows how the battens and chine log are sunk flush with the edge of the frame.

be set as indicated on the construction plan. These will be gotten out to a crown of 3 in. in the width of the boat. They fasten to the shelf with galvanized boat nails. Every third beam should be through bolted to the shaft, using ¼ in. diameter bolts for this purpose. In the way of the forward and after hatches, and the deck house headers must be cut in; these being of the same materials and dimensions as the beams themselves. The cockpit floor beams will also be the same as the deck beams but these will be gotten out without any crown. Forward there will be a doubling piece from the deck house to the bow made from 1¼ in. by 10 in. oak. This doubling should be halved into the deck beams so as to come flush with their tops. The hole for the is cut through this.



This is how butt blocks are riveted in place.

The deck will be covered with ¾ in. by 3 in. tongue and groove white pine fastened

(Continued on page 184)

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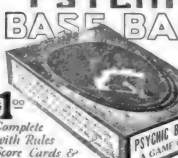

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Plans for "Waterwitch"

down with galvanized boat nails. Around the edge of the deck it should be fastened into the edge of the top plank with brass screws. In nailing on the deck planks drive one fastening into the tongue just as flooring is blind nailed, and one into the center of the plank. Do not be sparing with fastenings, you know the deck strengthens the entire boat, keeps the structure from wringing, and is a very vital part of the construction.

After planing off the wood should be given a coat of oil paint. Then fill the nail head holes with putty. The deck is to be covered with canvas, 10 oz.; this should be laid in wet paint or in Jeffery's liquid marine glue. The latter is the best. The canvas must be stretched tight and will be turned down over the corner of the deck. Use copper tacks about ¾ in. long, and set these about an inch apart. The rough edge of the canvas will be covered later with the ⅞ in. half round moulding that runs all along the edge of the deck. After the marine glue has hardened the canvas should be given three coats of flat paint, color to suit the individual owner. If flat paint, that is paint that is mixed with turpentine and not oil, is used the deck will not show cracks or blisters. Leave at least four inches of canvas inside the openings for the cabin house and the two hatches. After the house sides are on, this piece of canvas will be turned up inside as shown in Figure 12. The work along here will never leak if this is taken care of as described.

The cockpit floor will be laid just the same as the deck and also covered with canvas. Here, too, the canvas must be turned up against the cockpit sides and ends. A 1-inch diameter lead pipe will be put in the two after corners of the cockpit, the purpose of these being to drain water from the cockpit. These are simply flanged over the canvas on the cockpit floor and flanged outside on the planking.

The cabin house sides will be made from ⅞ in. white pine. Run long screws up from the underside of the heading along the house side and also through, fasten with three ¼ in. diameter rods each side. The rods will have nuts on both ends. The ends of the cabin house will be made and fastened the same.

Thank You for Mentioning Modern Mechanics and Inventions for December When Writing to Advertisers

Plans for "Waterwitch"

The deck carlins will be made from 1 by 1½ in. white oak and will be spaced 12 inches c. to c. They must be mortised into the sides and fastened with screws. The cabin top will be covered with ⅝ in. by 2 in. tongue and groove white pine and after having been laid and planed off will be covered with 10 oz. canvas, just the same as the main deck. Lay this canvas in marine glue and let the goods run out into the hatchways just as on the deck.

The companion slide will be made from ⅞ in. thick mahogany. This is built on two carlins of the same crown as the deck. The rails are grooved inside and small nubs left on the ends of the two carlins. The nubs slide in the grooves. At the forward end there is a cross member between the two rails, this must be made perfectly watertight. There is a lip piece on the slide which, when the hatch is closed, comes against the water tight piece between the two rails. If this is all made with careful joints the hatch will not leak a drop. Rather than doors swinging on hinges use a drop in the companionway opening. This can be made in two narrow pieces so as to be tucked away when the thing is open.

The coaming will be made from ⅞ in. white pine and will be fastened to the deck with ¼ in. rod. You will have the experts telling you to leave the coaming off; but don't. They are a nice protection and belong on the boat.

The rudder will be made from 1½ in. yellow pine. It will have to be built up from several widths and doweled with ⅜ in. galvanized rod. It will be hung on regular pintles as shown in Figure 13.

The bottom after having been thoroughly planed and sandpapered should be given a coat of red lead paint thinned somewhat with oil and turpentine. The topsides if they are to be kept white should be primed with white lead paint and then finished with flat white. The advantage of flat white is that it can be easily washed and keeps much better on a boat than glossy paint.

You will need some good anti-fouling composition on the bottom. The best is Bridgeport Bronze; a bronze powder preparation that will keep more free from marine growths than any other paint I know of.

(Continued on page 186)

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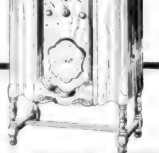

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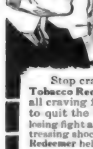

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Plans for "Waterwitch"

(Continued from page 185)

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A Flying Model Sailplane

(Continued from page 150)

the ragged ends of the covering at the wing tips. Apply two coats of dope to the covering with about four hours drying time between each coat. The stabilizer and rudder are covered and doped in the same manner as the wing.

In covering the fuselage cut the covering material into panels shaped to fit the contours and stretch lengthwise along it. Glue these panels to the longerons and avoid gluing the uprights and cross pieces as much as possible. This procedure insures a nice appearing job when the dope has finally shrunk the covering tight.

Cement the rudder and stabilizer in place on the tail of the fuselage, using ambroid for this purpose. Set them for normal straight level flight and allow them to dry on in this position. If either the rudder or stabilizer should be knocked off, it is a simple matter to stick them back in place with fresh ambroid.

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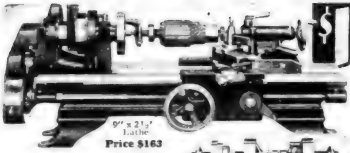

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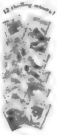

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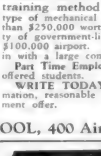

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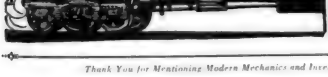

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Build a House That Pays Income

(Continued from page 161)

cestry with an arched open porch below enclosed by a wrought iron rail; rusticated gate leading to grade entrance; red tile roof; rusticated corner and deeply panelled entrance door. Furthermore the exterior finish is stucco and in keeping with Mediterranean tradition.

Summing up the general appearance, this duplex has style, color and modernistic lines, all of which are important from a point of view of easy renting and ready resale value. Renters like to live in a good looking house.

But that's not all. Study the plan. There are five good rooms in each flat, a bathroom, a porch, which may be either open or enclosed, a fireplace and adequate closet space. Most renters demand at least two bedrooms. You have them here each with good ventilation, light and closet space.

While the kitchens are small they have been planned as "wife savers" to cut down useless walking and needless labor. They will prove joys to housewives.

What about the cost to build? Estimates by reliable builders suggest $12,500 as a price range, not including the lot, in or near large cities. It is fair to assume the cost may be less in smaller communities. The cost will vary depending upon where and how you build.

Finally, the house can be built of frame with stucco finish on metal lath, or stucco on hollow tile, or of common brick either painted white or whitewashed. It will look well done in skintled brick or face brick veneer.

You have here a flexible duplex as far as materials are concerned, minimum requirements by most renters and as I said in the beginning of this article, if you want to make one lot, one roof, one basement excavation do the work of two and thereby sweeten the family pocketbook to the tune of perhaps $50 per month or more, you'll look long before you find a better plan and more modern two-family house tha this one.

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Of MODERN MECHANICS AND INVENTIONS, published monthly at Minneapolis, Minnesota, for October 1, 1930

State of Minnesota } ss
County of Hennepin }

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared R. M. Crutcher, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the MODERN MECHANICS AND INVENTIONS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, W. H. Fawcett, Minneapolis, Minn.

Editor, Roscoe Fawcett, Minneapolis, Minn.

Managing Editor, J. G. Smalley, Minneapolis, Minn.

Business Manager, R. M. Crutcher, Minneapolis, Minn.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

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4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

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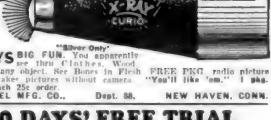

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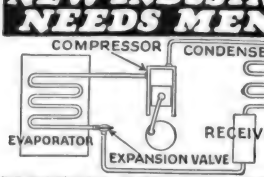

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How I Beat Lindbergh's Record

(Continued from page 125)

I looked at my watch. I found that I had already covered half my ground in 5 hours, 47 minutes and 11 seconds, fifty-two minutes ahead of Lindbergh. Another 15-minute stop for refueling and oil. I didn't get out of my plane. So far the weather had been with me. At Wichita a mechanic handed me a weather report which showed that St. Louis was in a storm area. And my race was only half-won.

The St. Louis storm didn't matter very much. I managed to get up over a rainstorm and I got away from Kansas and Missouri in lightning style. I flashed across Illinois, at the junction of the Missouri and Mississippi rivers, losing my last helping wind there. I had left Wichita at 12:36 and had sped through the Middle West in three hours, coming up at Indianapolis at 3:22, for another record.

In the last leg of my flight I rose to a height of 8,000 feet to keep above a blanket of fog and smoke. I flew north of Dayton and Columbus and then roared on into the Pennsylvania hills, threading my way through the mountains and making between three and four miles a minute. Then I crossed the Delaware in the full glare of the afternoon sun. To the eastward the blue horizon of the Atlantic Ocean was in view —and in it I saw the establishment of a new record.

I skirted along the coastline to Sandy Hook, never for a moment growing less cautious or letting up in my speed. The architectural spires of Manhattan reared before me. My goal was but a stone's throw within reach. I felt that a new and grander fame was beckoning to me. Still without relenting in the powerful speed which I had maintained, I made for the Curtiss Airport. It was 6:40 p. m. when I rolled onto the field.

I remember there was a lot of cajoling going on that hour when I landed for the first thing I said was, "Well, when do we eat," That was another instinct crying out. Nobody seemed to worry very much about food except myself, so I just helped myself to the rest of mother's sandwiches.

You ask me what the chief element was in the hanging up of a new record for flying from the Pacific to the Atlantic coast. Well.

(Continued on page 194)

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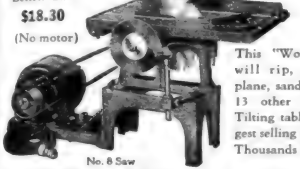

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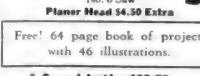

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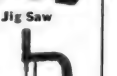

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How I Beat Lindbergh's Record

(Continued from page 192)

first of all I would say that the "Texaco 13" is so constructed that it is the fastest plane possible to date for such a long distance flight. There are faster planes, such as those which figured in the Schneider Cup race, doing as high as 400 miles an hour, but they would burn out in any such gruelling ordeal as a trans-continental flight.

Another phase to be reckoned with is the weather. I was lucky enough to get weather beyond compare, getting only a brief period of rain around St. Louis. On the other hand, my flight has convinced me that favorable and adverse winds will about equalize themselves on a trip of that sort.

The success of a flight of this nature also depends in a large measure on your mechanics. I cannot begin to express how grateful I felt toward the mechanics at my starting-point and all along the route. They first saw that my machine was in perfect condition and then that it continued to remain in that state. I have always preferred to keep myself out of the picture in discussing the glories of aviation and although I am conscious of a sense of modesty which possesses our lot, I must say in order to make my record complete that a good machine and good weather demand a good pilot and a good navigator at the controls.

My feat should stimulate greater commercial flying activity. Perhaps a sort of "pony express" service might be established for big business from coast to coast in the delivering of money, stocks and documents. This service could be facilitated by having airplanes work in relays. The day will come when even my record will be trimmed considerably. I might have done better if I hadn't munched those two sandwiches.

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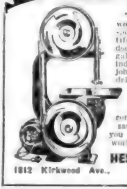

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Trapping Animal Gangsters

(Continued from page 134)

"Upon receipt of Carrow's letter I went to Kingman by train, met Mr. Carrow on the evening of August 31 and arranged to get out to his range on the morning of September first to try and poison the wolf. Upon arrival we killed a colt, made up several hundred pork-fat poison baits and started across the range in an automobile, scattering the poison baits as we went.

"About 1:30 in the day as we drove near a big tank, Mr. Carrow said there was a coyote on the left hand side of the car. Looking up I discovered that it was not a coyote but a wolf. However, I could hardly believe that the famous old wolf would be out on an open plain in the middle of the day. I told Mr. Carrow to drive the car in the same direction we were going, which would be passing the wolf and not driving towards him. He apparently paid little attention to the car but was walking slowly along the hillside.

"However, pretty soon I noticed that the sly old fellow was indeed watching us out of the corner of his eye. Now, we had nothing in the automobile to shoot with except a 30-30 carbine with the rear sight broken off. However, I had shot the gun several times earlier in the day and had some idea as to how to manage it, so I determined to take a chance. As the car pulled opposite the wolf I stepped out on the opposite side of the car from where he was standing, and raised my gun so there would be no apparent motion while the wolf was in sight.

"As the gun cracked the wolf bit himself on the shoulder and I was sure I had him although it seemed too good to believe. He jumped into the air and ran at full speed, perhaps for 75 yards, when he fell dead without a struggle. When we got to him we saw at once that it was indeed the old renegade and that he had been shot once before, though not seriously.

"Needless to say, Mr. Carrow was delighted. He threw the wolf into the car and drove back to Kingman, arriving at four o'clock with the wolf. He was the largest wolf I had ever seen on the range. When we held him up his hind legs extended to the top of my hat while the nose touched the ground. He weighed 78 pounds after the skin from the shoulder to the head was removed, together with the lower part of the

front legs; and about all the blood had run out of him, for I had shot him directly through the heart. He bled freely.

"This marked the end of one of the greatest cow-killers of the state of Arizona, if not the entire southwest. Mr. Carrow's foreman actually had found 50 head of white-faced yearlings during the past year that this wolf had killed and the Carrow range is only one of several that the wily old animal had worked on."

Winter, when the stock comes in from the summer range, is the time selected for the strongest drive against the coyote. Then it is that the coyote hungers, and the summer pasture is free for the government hunter to work without danger to the grazing stock. There are no sheep or cattle to fall victims to the poison, no sheep dogs to eat it and crawl away—only the four-footed bandits of plain and mountain.

Fifty-thousand choice morsels of meat, cut into convenient size for gobbling up by a hungry sheep killer, each tiny morsel with its portion of poison tucked safely away inside, tasteless and effective. That is the quantity that was set one year for the state of Nevada alone. Seventy-five thousand mouthfuls of meat and poison for New Mexico. One hundred and ninety-two thousand for Arizona. Half a million for Utah! Thus is the table of the western pasture prepared for the slinking bandit who prowls and preys wherever he may, skulking by day and slaying by night the finest and choicest of the farmer's lambs and sheep and calves.

For weeks before the actual baiting begins the stockmen are enlisted and organized and taught the part they must play in this relentless warfare against the vast animal underworld. Each community has its own leaders in the work, being mobilized efficiently preparatory to spreading the message of death against the natural enemy of the community's economic life.

Sometimes it is necessary to train the coyote into going for his food to certain free lunch counters which later are converted into death-stands for him. In these instances, a bait free from poison, generally fresh meat. When the coyotes are accustomed to come here for their food, and the tracks in the mud or snow show that the murderers are plentiful, the approaches to

(Continued on page 198)

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Trapping Animal Gangsters

(Continued from page 197)

the feeding station are provided with delectable sandwiches of freshly killed meat coated with poison, just the size to fit a cruel mouth and slavering jaws. These little sandwiches, cut about an inch square and from a quarter to a half inch thick, are planted in the favorite paths which the coyotes take in approaching the bait. The murderer doesn't know he has taken poison until a sudden message from his interior department conveys the fatal tidings.

Occasionally when a stand is far up a mountainside or in the high hills where the snow comes early and stays late, or in regions which for any reason soon become inaccessible for the stockman to visit, the government hunter places a carcass of fresh meat at a strategic point for the animals, loaded with many balls of fat, sunk into the flesh and covered over.

Reports from various parts of the West show that the hunters are killing coyotes in large numbers by this method. For instance, two hunters placed a 300-mile poison line in about five weeks, using 20 horses and burros for bait. When they got back to the beginning of the poison line they found 40 dead coyotes at the first two stations, whereas stockmen all along the line told of finding up to 73 of the animal gangsters.

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General design and construction; Irwin Meteorplane one place job with enclosed cabin. Successful Trail Blazer last January. Plane in storage since, due to State law grounding unlicensed aircraft. Can be flown where local laws permit, as identification numbers can be assigned. Powered with Henderson motor, swinging 5' 10" Stowy propeller at 2500 r.p.m. on ground, 2700 take off, 2300 in climb. Wingspread 20'. Length 15'. Cabin removable. Steel stick and rudders. Full instrument board. Estimated speeds from test flights: Full speed, 65 mph; land and takeoff, 100; climb, 600 ft. per minute. No wing flutter in flight and small noticeable vibration. Direct inquiries to builder, E. W. McClure, 2351 San Fernando Rd., Los Angeles, Calif.

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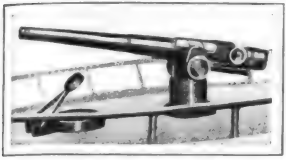
Of Interest to Model Builders

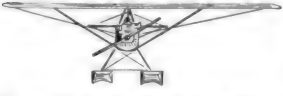


A deck gun on Mark Cooper's model submarine.

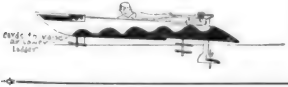
WHAT with miniature golf and ping pong taking the place of the grown-up sports, it may be that many of our amateur builders will want to work on some models during the winter months. If so, here's a letter from Mark A. Cooper of Rome, Georgia, which will interest you:

> **I enclose herewith a photo of my model of the submarine S-51, which is nearly completed. This is an electrically driven model, and has provision for diving, though any diving by a model submarine is extremely uncertain. I have built them before.**
>
> **I should like to get something started in the way of building model warships; or, rather, get in touch with those who are doing this. I can give them plans, and also, if necessary, 5x8 enlargements. There is no charge; this is merely a hobby.**
>
> **I would appreciate it if you could do something to bring together any men who are interested in making model warships. I know of two or three, but there probably are lots of them.**

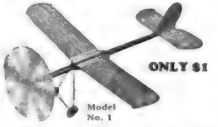
There's your chance. Just write to Mr. Cooper at Rome, Ga., and he will send you the dope.



FRANCIS W. HAGERTY of Dorchester, Mass., sends in these two drawings, with the request that we get plans for something like them. Well, we think the top idea is well taken care of in the 1931 Flying Manual, while the one on the bottom is interesting but a little too complicated for the amateur.



Get this for Christmas



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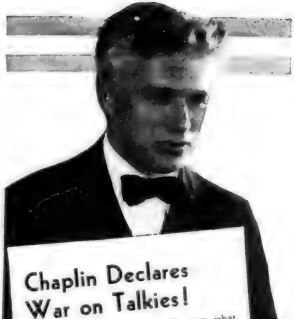

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Looking Over the NEW BOOKS

HENLEY'S ABC of GLIDING and SAILFLYING. By Victor W. Page. The Norman W. Henley Pub. Co. $2 8¼ x 6; 294 pp. New York

This is the most complete treatise on gliders and sailplanes available. Major Page, who also wrote MODERN AIRCRAFT ENGINES and MODERN AIRCRAFT, undertakes this subject in the same thorough manner that characterized his former works. This book will prove invaluable to the amateur builder and glider pilot.

This treatise contains a brief history of motorless gliding and sailflying, with an interesting study of the flight of birds. Complete instructions for launching, towing, gliding and soaring are given, while his chapter on terrain and cloud formations, with their effect upon air currents, is something that should be studied by every glider pilot.

The last half of the book is devoted to a description of practically every successful glider and sailplane. The Northrup, Bowlus, and Lawrence jobs, plans of which were published in MODERN MECHANICS AND INVENTIONS and the FLYING MANUAL, are given as examples of the various glider types. The illustrations are adequate and the book is completely indexed.

MY AUTOMOBILE: Its Operation and Care. By Harold F. Blanchard, M. E. Scientific Book Corp. $3.50 8¼ x 5½ 373 pp. New York

This is a hand-book for the average owner and driver. If all persons buying their first car would study this book, they would save themselves the cost of the volume within two or three days by reducing the wear and tear to which the beginner always subjects his car before he learns what it's all about.

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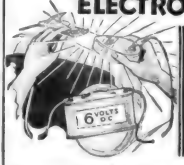

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Turn back to Page 76

Will Monster Insects Rule World?

(Continued from page 73)

It has been remarked that ants, beetles and other insects often move objects many times as big as themselves, and weighing much more. They do other things equally marvelous. Take the road builders, for example. Unaided they clear and grade highways, which, in proportion to the size of the builders, equal anything that man himself has done with modern machinery. The common names of some of the many ant species indicate some of the many things for which they are remarkable. There are bakers, beggars, brood-stealers, carpenters, coopers, diggers, gardeners, gipsies, grain gatherers, guests, harvesters, highwaymen, honey makers, jumpers, leaf-cutters, masons, milkmaids, miners, mushroom growers, nomads, nurses, paper makers, paper workers, robber barons, robber guests, roofers, slave holders, soldiers, sowers, spinners, tapestry hangers, termite hunters, thieves, vegetable growers, and wood cutters—the name in each case indicating the task the species or group does the best.

The robber guests, as described by Dr. Hans Ewers, the famous German naturalist, live something like ancient robber barons. They first attack the nest of another species, kill the queen and soldiers, and then rear the brood as slaves. As soon as the young brood is grown it takes over the feeding of the robber guests, and the care of the master's children. Instead of raising workers only, however, the robbers raise slave queens to perpetuate the slave population. Once the community is organized and doing well, the robbers settle down to spend the rest of their lives eating and holding games and athletic contests.

Society, in fact, is so well organized in antdom that it is not remarkable that the great Bismarck once said: "If I had to choose the form I would rather live in again, I think it would be as an ant. Just see: this little creature lives under a perfect political organization. All ants are obliged to labor, to lead a useful life; all are industrious, and perfect subordination prevails, with discipline and order. They are happy because they work."

Bismarck, apparently, had never heard of the guest ants who neither toil nor spin.

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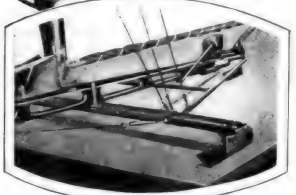
HERE is a cleverly constructed model ice yacht on which every fitting and part is true to scale and in keeping with the best practices in yacht construction, with the exception of a novel steering and sheet tending upon which the builder, Peter Van Denbossche of Mt. Clemens, Mich., was experimenting. The model, which has been sailed, measures three feet in length. Runners and other metal fittings are made of solid brass.

The steering and sheet tending ideas shown in this model are designs new to yacht builders.



Here is a closeup of the running gear of the yacht, showing the construction of runners.

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Nutty Inventions Paid Me Million

(Continued from page 82)

there, or probably somebody got tired, and today it may be seen hanging proudly in my father's home.

From that day on I could be found wistfully staring out of windows, fashioning sketches in my imagination and dreaming of triumphs yet to be. I remember when I first took up mechanical engineering how everything was automatically translated in my mind into sketches and not into mathematical formulae. Toward my senior year at the University of California I began to fall away from serious types of drawing and drifted into the field of caricatures.

The climax, the all-surpassing turning-point came in my last year at college. I had always penetrated to the funny side of scientific works. The course in analytic mechanics amused me most that way. The apparatus which they constructed in that course was baffling and almost supernatural. The professor himself seemed like some one superhuman. He was a tall, gangling, wizened crony with a red beard and an Adam's apple that kept bobbing all the time he talked. He also wore gold-rimmed glasses. Most of the time he looked like he was a part of the machinery.

One particular morning the professor presented us with a mechanism by which he could determine the weight of the earth. It was a mangled and complicated system of test-tubes, retorts, levers, dynamos and other instruments which, I frankly admit, I never deciphered.

The professor rapped for attention, I distinctly remember, and as we all looked on breathlessly, for fear that this might be some infernal machine, he announced to us in solemn accents that the engine before us was a barodick. I could have laughed right out, because it didn't mean a thing to me, and yet it was the funniest thing I have ever seen in motion.

I never got over the barodick. Ten years had elapsed and one day the vision of that goofy contraption returned to me. The idea burgeoned into a grand reality, but that's skipping ten years too lightly. Let us go back a little and get a view of the trials and tribulations of the rising cartoonist.

That job in the City Engineer's office blew up after three months. Shortly afterward I

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thought I had to go in for mining engineering seriously, but I got one glimpse down into a mine shaft and then and there my nerves told me I was an artist. I subsequently got a job on the *San Francisco Chronicle* at $8 a week. I drew pictures for the paper every day for three months, and not one of them was ever published.

Finally I landed in the sports department and I drew fight pictures which got into the paper. Then the *San Francisco Bulletin* lured me away from the *Chronicle;* there was so much favorable talk about the Rube's fight sketches. Then I looked for other horizons. New York was elected.

I was 23 when I reached New York. I had resolved to strike out on my own. Five editors today can enjoy the privilege of saying that they threw me out of their offices when I first got to town. I was footloose for only twelve days when the very perceiving editor of *The Mail* took a chance on me, and vice versa.

The first series of my cartoons which clicked was the Foolish Questions number. I hit on that one quite accidentally. I had drawn a picture of a man who had just fallen out of a five-story window. As he lay in a heap on the sidewalk a lady chanced to come along and she inquired, "Are you hurt?"

In astonishment, he looked up and replied, "Oh, no. I'm just taking my beauty sleep."

That started the Foolish Question rage. I doped out all I could. But I was a mental midget compared to the thousands which poured in from my new army of followers. I figure I received 50,000 Foolish Questions —and I was foolish enough to answer them. Of course, those answers appeared in syndicated cartoons, which was all part of the mysterious process of turning ink into what it takes to keep the wolf away.

It was just about ten years ago that I decided to use my knowledge of mechanical engineering in my career as a cartoonist and artist. The combination has not been a barren pastime from a financial standpoint since it brought me some measure of fame and about $500,000, more or less. There's a lot of magic hidden in a bottle of ink if you know how. Right now I'm busy on a very special invention. I'm trying to contrive an apparatus that will do all my drawing for me, but then it might take all my life savings to manufacture it!

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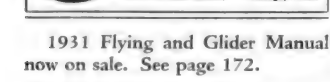

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The Robbins Transmitter

(Continued from page 119)

of flexible braided wire. Fasten a pee-wee or battery clip to one end and solder the other end to the common point, just described, thus connecting the centers of resistors and condensers in the filament circuit. Then from this same point solder a second wire and connect it to "K" binding post nearest the panel. Also connect this post to one side of a .002 mfd. fixed key condenser, wiring the other side of condenser back to the second "K" binding post, and from there back to the B minus binding post.

The power circuit is then started from the B plus binding post, which should be wired direct to the movable arm terminal on the single pole double throw switch placed on the base alongside the choke mounting. Wire one side of this switch to the plus side of the milliammeter and connect the minus side of the latter to the spring clip supporting the choke. Then wire this same clip to the remaining terminal on the switch. If no milliammeter is to be used, then simply run a wire from the B plus binding post direct to the spring clip holding the choke.

Now lead a wire from the choke Fahnestock clip down to the socket plate post which has already been bolted to one side of the .001 mfd. fixed condenser. The other side of this condenser is soldered to one end of one of the primary coil brass supporting strips as previously described.

Place the 5-turn antenna coil on its glass slides and connect the wire leading from the end nearest the primary coil to the stator of the left hand .0005 mfd. variable condenser on the panel. Connect the rotor terminal of this condenser to the ground post of the transmitter. Then connect the lead from the outside end turn to either the antenna post direct or through the antenna meter or resonance indicator to the antenna post.

It is customary to tune the antenna system to the oscillator by means of the ammeter, but these manufactured radiation meters are quite expensive. A perfectly satisfactory resonance indicator can be easily made from inexpensive materials that will indicate, not the amount of current being radiated, of course, but the peak of radiation—and that is the principal thing to know anyway. The

(Continued on page 208)

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1931 Flying and Glider Manual now on sale. See page 172.

The Robbins Transmitter

(Continued from page 206)

indicator and its method of installation on the transmitter are shown in Figs. 2 and 5.

To make the indicator, cut out a little base of thin wood that will fasten to the transmitter base back of the antenna coil mountings. On it place any spare rheostat, single pole double throw switch, flashlight bulb socket and a pair of binding posts, as shown, and arrange and wire them as shown in Fig. 5. One side of the switch connects to the rheostat and the other rheostat terminal to the dry cell binding post. Then connect the opposite side of the switch to the second dry cell binding post and to one side of the bulb socket. The remaining side of socket is then wired to the lever of switch, which is in turn wired to the outer end of the antenna coil. The binding post of the switch that is connected to the bulb is then connected also to the antenna binding post of the transmitter. Then connect a 1½-volt dry cell to the two indicator binding posts for lighting the lamp filament. When the switch is in the position shown the indicator is cut out. When the lever is over it is in the circuit.

This completes the transmitter for use with a key for code work. A cabinet, of course, can be made to cover up the parts and keep out dust, but that will be left to the discretion of the builder.

As to the power supply, a 6-volt storage battery may be used for the filament; if this is not available, 6 volts AC from a step down transformer can be utilized. The voltage for the plate may be supplied by the devices shown in Fig. 6, between 175 and 250 volts being required. It is essential above all that the current be as pure direct current as possible. This is required by law. Next month's issue of MODERN MECHANICS AND INVENTIONS will contain the second part of this article.

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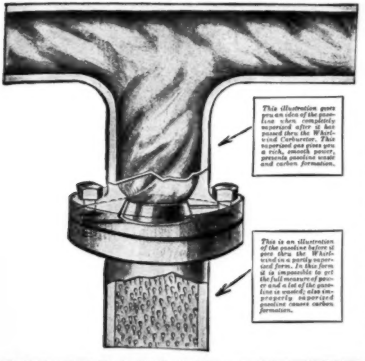
Auto Owners Now Save Millions of Gallons of Gas

A new invention called the Whirlwind is actually saving millions of gallons of gasoline for automobile owners. Those who have installed this amazing device on their cars report almost unbelievable gasoline savings. They also report more speed and power, quicker starting and disappearance of carbon.



The marvelous thing about this Whirlwind is that it works as well on all makes of cars. Reports are received from owners of practically every known make of automobile from Fords to Lincolns and they are all equally enthusiastic in their praise.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

SALESMEN AND DISTRIBUTORS WANTED

To Make up to $100.00 A Week and More

Whirlwind men are making big profits supplying this fast selling device that car owners cannot afford to be without. Good territory still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within 30 days, or the trial will cost you nothing. We invite you to get it at our risk and expense. You are to be the sole judge.

WHIRLWIND MFG. CO.

DEPT. 999-378-A THIRD ST.

MILWAUKEE, WISCONSIN

Free Offer Coupon

Whirlwind Mfg. Co.,
999-378-A Third St., Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carburetting device and tell me how I can get one free. This does not obligate me in any way whatever.

NAME.....

ADDRESS.....

CITY.....

COUNTY..... STATE.....

Check here if you are interested in full or part time salesman position.

"It's a fact. . . six months ago I couldn't play a note!"

"But now I'm making $75 a week and *I'll bet you'd trade places with me in a minute!*"

I'VE JUST LICKED HARRY THOMPSON.

Our "fight" started way back in grammar school. Harry always seemed to *get* what he wanted—have all the friends and all the good times. I never was able to catch up with him in anything.

Harry and I have always been friendly, you understand—but I envied him.

Six months ago the town newspaper came out with the headline, "Local Boy Makes Good"—telling how Harry was going to Europe to study textiles for the mill here.

But how about *me*? I had been laid off. Having nothing else to do, I was reading a magazine at home when I found an advertisement that had possibilities. It claimed that I could learn to play the Tenor Banjo at home, in a few short months—become popular, make more money.

I sent the coupon for a Free Book. When it came, I thought it over carefully, and finally sent in my enrollment.

The first lesson came and was fascinating! With it I received a handsome Tenor Banjo. I had never had one in my hands before—but simply holding it seemed to tell me that at last I had found my own private 'key to success.'

Within an hour after unpacking my Banjo, I was playing a simple tune. Then I turned to another marvelous feature—the Phonograph Records of each number, played by a famous Tenor Banjoist. I checked up immediately on the lesson I had learned, corrected my mistakes—and knew that I finally had both feet square on the right road at last!

Almost before I knew it, I was actually coaxing some downright "hot" music out of my Tenor Banjo. My few friends simply couldn't get enough of my playing!

A month later Bob Chase signed me on to play with his Serenaders. Seventy-five an evening three nights a week—$22.50 a week extra money for me! I was walking on air. Then we got the contract here at the hotel. My salary jumped to $75.00 a week.

But last Saturday night was the climax. About ten o'clock who should come in but my old rival—Harry Thompson. Though I knew that at last I'd stepped ahead of him, there was still one thing that worried me. With him was Ruth Martin. Everyone had always said—"Ruth is a great girl all right. But she's a little stand-offish—she's waiting for the right man to come along."

I watched her dancing. What wouldn't I give for a chance to tell her what *I* had always thought about her!

At last we stopped playing. The evening was over. Bob Chase, my boss, came over to me with my pay envelope for the week. "Good work, Jerry!" he exclaimed, "keep up the pace, and there'll be a raise in there later on."

But I still was thinking about Ruth. Then I saw her—she was pulling Harry over *my* way! "That was great, Jerry!" she greeted me warmly; "I never had any idea you could play that way!"

"To tell you the truth, Ruth," I replied—"six months ago I didn't even know one note from another! But now," I added, meaningly, "I have *almost* everything my heart desires!"

. . . and I know from her look when I said "almost everything"—that I can dare hope for *everything*, now!

* * * * *

Send the coupon below for *your* copy of the Big FREE Book, "The Play-Way to Popularity and Big Pay." It tells and *proves* exactly *how*—in a short time, right at home—you can learn the Tenor Banjo for play or pay. Read about the splendid Tenor Banjo that comes with your very first lesson.

More good times, more friends and more money are waiting for you. Get them this easy, fascinating way. Send the coupon—read the book—then judge for yourself!

Send today for this **FREE** *Book*

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Deaf-Dumb-Blind Yet "He" STOPS Auto Thieves

What in the world IS this uncanny new discovery that so instantly terrifies auto thieves? Thieves fear it worse than poison. Its terrible power literally "petrifies" them. They cannot even remove a thing. Now your car can be absolutely safe, anywhere you leave it. Don't confuse this queer new invention with anything you ever saw. It is not a bell. Not a lock. Not an explosion. Not an electrical shocker. Not a poison gas. Yet the deadly fear it puts into thieves throws them into a panic. It works automatically the instant anyone even touches your car. Cannot injure innocent persons. Recommended by police and insurance companies. No bigger than your hand. Costs only one penny a year to operate. Almost never wears out. The cheapest, surest theft insurance you can buy. And that's not all. Excites and amuses everybody. Have lots of fun with your friends.

Mysterious New Invention Offers Agents Up To $40 a Day

So startling, so absolutely new, so peculiar is this strange discovery that agents who have already taken it on are stunding daily profit records. The greatest crowd gatherer you ever saw. The minute you demonstrate this clever invention people are bewildered. They want to know how it "stiffens," "hypnotizes," "shell shocks" thieves. The need for this scientific protection is so great—the big profit possibilities are so almost unlimited and easy—that now we will actually pay you just to demonstrate this amazing thief chaser. You don't need to sell a single one to make this money. Just stand on the street by your car and make it perform its magic wonders that set your audience agog and bring quick profits. No use wasting your time any longer with "plug" propositions. $40, $50, $75 a day is not too much to expect, is it? If we did not feel sure that you could make as much money as other men with this uncanny new discovery we certainly would not be willing to offer you pay just for demonstrating it. The protection it gives—its utter queerness—its strange power to put fear into thieves—and the fun it gives motorists make it the easiest, fastest selling, biggest money-making opportunity for you in many years.

We Pay You Just To Show It To Motorists

The market is so tremendous—orders are pouring in so fast—that we can afford to do almost unheard of things for our local distributors. Not only will we pay you just for testing it, but we will actually send you a Free Sample offer for your own car so that your car and accessories will be protected and to start you demonstrating it. Yet that's not all. We actually offer to pay you cash for merely testing it on your car. Now we have territories for 1,000 more county distributors and 100 district managers on this generous pay plan. With our nation-wide advertising plans ready to start at once, distributors should be literally flooded with orders. We have worked out a new plan so that you don't have to do any selling or demonstrating to car owners to make big money.

We Pay You Just To Test It

FREE SAMPLE OFFER

Rush the coupon for your Free Sample offer—offer to pay for demonstrating and plan that gets you big money without doing any selling or demonstrating to car owners. Send no money. Just coupon. This is not an order. Nothing will be sent C. O. D. This Sample Offer is yours free of all cost. Just mail coupon now.

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5769 Garver Bldg., Des Moines, Iowa.

I accept your proposal. Free Sample offer of your invention now for my own car. Also your unbelievable plan that this offer costs me nothing—is free of cost. Nothing will be sent C. O. D. and I am not obligated in any way to buy anything or to become your distributor. You are to send me actual sample for me for testing it on my own car. Please send details of your offer if Pay for Demonstrating it, and also your plan that offers me big money even without demonstrating it unless I want to. If I become your local distributor you agree to give me exclusive territory.

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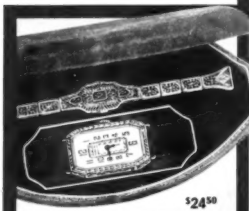

$24.50

EL 41 . . . The new Deauville Combination Beautifully engraved rectangular case. Accurate, dependable 15-jewel movement. Pierced flexible, link bracelet with beautiful center design, set with 3 Emeralds or Sapphires and silk grosgrain ribbon band—elegant gift case. Only $2.35 a month.

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EL 8 . . Diamond Wrist Watch. 2 genuine diamonds and 8 emeralds or sapphires set in engraved 14K Solid White Gold Case. Guaranteed 15-jewel movement. Pierced flexible "Wristacrat" bracelet with sapphires or emeralds to match. Only $3.65 a month.

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EL 40 . . . "Lone Eagle"—Dedicated to Col. Charles A. Lindbergh—Handsomely engraved lifetime case, guaranteed 15-jewel movement. Radium hands and dial. Patented "dust-tite" protector. Flexible link bracelet to match. Only $3.65 a month.

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Completely illustrated new catalog of genuine diamonds, Bulova, Elgin, Waltham, Hamilton, Howard Illinois watches; fine jewelry and silverware at special prices. Write now to get your Free Copy.

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EL 10 . . . Nationally advertised, tested and regulated 15-jewel **Waltham** movement; 20-year warranted, engraved White Gold filled, 12 size, thin model, decagon case. White gold filled knife, fine Waldemar chain. All complete in fine gift case. Only $2.65 a month.

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EL 42 . . . Nationally Advertised **Waltham** or **Elgin**; guaranteed accurate and dependable. Handsomely engraved lifetime case. Very latest style "Hollywood" bracelet, with extension opening. Only $2.10 a month.

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EL 48 . . Charming, new lace design, 18K Solid White Gold dinner ring, set with 3 perfectly matched genuine blue-white diamonds, 2 French blue sapphires on sides. Only $4.90 a month.

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EL 18 . . Wedding ring of beautifully hand engraved 18K Solid White Gold set with 7 expertly matched, genuine blue-white diamonds. Only $2.48 a month.

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EL 7 . . Gentlemen's massive ring, 14K solid green gold with the latest style 18K solid white gold top; fiery, genuine blue-white diamond. Only $4.90 a month.

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EL 22 . . . Gentlemen's massive, hand engraved ring of 14K Solid White Gold. Imported Black Onyx with a genuine fiery diamond or any carved initial or standard emblem desired. Only $2.65 a month.

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EL 44 . . . Very chic—beautiful hand pierced floral design ring of 18K Solid White Gold, set with genuine Aquamarine or any birthstone; 2 genuine diamonds on sides. Only $2.40 a month.

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